THE SECRET SCIENCE OF COVERT INKS

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INTRODUCTION

This is a reference volume for those desiring ready access to information about the covert inks used by criminals, intelligence agencies and others. Except for the limited instruction in spy centers, there is no course in covert inks available to enforcement and security officers in the United States. This book is offered as the basis for such a course of instruction. It is a "how-to," self-study book for police and security officers, federal agencies, state police, county sheriffs, prison wardens and others — for anyone who wishes to improve their knowledge of secret inks.

Covert inks are commonly used in espionage. It is not enough for a spy to obtain information; he has to send it to his organization, and this is the most dangerous part of his work. Of all the spies who are captured, about ninety percent are caught, not in the process of obtaining information, but when they attempt to report it through their secret channels. Although codes are popular in secret service work, since they can express more in less space, long messages are always dangerous. Thus, there is a need for something like invisible ink, which gives the impression that no message at all has been sent.

One of the most remarkable features of the world-wide clash of spies is their rivalry to concoct new and more effective covert inks. Many new inks have been discovered by

such research. However, Israel is the only country that has made a systematic investigation of the covert ink phenomenon and now leads all others in this field.

Some very ingenious methods of secretly carrying or sending supplies of invisible ink to spies have been discovered. In some cases, the ink is made to resemble medicine, soap, toothpaste, mouthwash, pomade, perfume or other toilet preparations, or is concealed in such articles. One method of carrying supplies is to saturate socks, shoe laces, handkerchiefs, neckties, cotton gloves, the cloth covering of buttons, scarves, or soft collars with the writing solution, and to dry them afterwards. When the ink is needed, it is recovered by soaking the articles in distilled water.

The information contained in this book was obtained by studying both published and documentary materials concerning the use of covert inks, and by interviewing people with expert knowledge of the subject, such as chemists, secret service agents, police, detectives, forgers, gamblers, criminals, magicians, mentalists, inventors, scientists, sexually unfaithful lovers and business executives.

Great care has been taken to insure that no information on covert inks has been given which is classified by the government as "top secret," affecting the national defense of the United States within the meaning of the Espionage Laws.

A knowledge of chemistry is not a prerequisite for the study of these secret inks, since the necessary information about each compound is given. However, in experimenting with any of the techniques discussed herein, it would be profitable for the reader to remember that mixing chemicals may be a dangerous business and that careless handling or ignorance might result in death or serious injury. Safety goggles and rubber gloves should be worn when handling acids and poisons. Do not inhale any vapors.

This is not a book for the general reader. It does not have the excitement of a spy story or an adventure novel, though the would-be writer of a novel about espionage might benefit

greatly from using it as a reference. In any case, it is a comprehensive volume on the use of secret inks by intelligence agents and others. Illustrated by numerous case histories, it describes how governments and others use such inks for covert communication.

Neither the author nor the publisher assumes any responsibility for the use or misuse of information contained in this book. It is sold for entertainment purposes only. Be warned!

AMMONIA INKS

Ammonia is a colorless gas having a strong pungent odor. It is extremely soluble in water: under ordinary temperature and pressure, one volume of water can dissolve 700 volumes of ammonia. Household ammonia, commonly available in supermarkets, is ammonia gas dissolved in water.

The secret inks in this chapter either contain ammonia, or else are developed with ammonia fumes.

INKS WHICH CONTAIN AMMONIA

Syrian Permanent Invisible Ink

Knowing that the Israeli government will not prosecute children, the National Security Bureau in Syria recruits young boys and girls as spies. Four Arab high school students, ages 14 to 16, were taken into custody in Rehovot. The children admitted they had been recruited by a teacher in Gaza, and had received a seven day course in which they were taught to identify weapons and submit information on troop movements, security measures in Israeli villages, and the location of military camps in invisible ink made by mixing one part linseed oil, 20 parts water of ammonia, and 100 parts of water. It is necessary to agitate the mixture each

time the pen is dipped into it, or else a little of the oil may separate and float on top, which will leave an oily stain on the paper. This ink is invisible after drying. To make the invisible writing or sketches appear, simply dip the paper into cold water. Upon drying, the traces disappear again, and reappear with each succeeding immersion in water.

Underground Blue Secret Ink

This secret ink has been used by FBI agents working undercover in the Communist Party. The "ink" itself is merely a strong solution of ammonia water — use it just as you get it from the supermarket. When the writing is thoroughly dry, it will be invisible. To develop the message, spray with a solution of cobalt nitrate. The writing will appear blue.

INKS WHICH ARE DEVELOPED WITH AMMONIA

The inks in this section are developed with ammonia. They produce writing which when dry is invisible. Put a few drops of ammonia water on a piece of absorbent cotton and place it in a jar or bottle. When you put the paper with the invisible writing in the jar, the message comes out clear and distinct.

Chinese Red Secret Ink

Used by agents of the Chinese Ministry of Public Security, this ink is made by mixing one part each of phenolphthalein, glycerin, alcohol, and carbon tetrachloride. When dry, it is colorless, but upon application of ammonia, it turns reddish. It disappears again when the ammonia vaporizes. This is used as a printing ink and messages are placed on the back of and sometimes between the lines of routine public bulletins.

Israeli Pale Blue Secret Ink

This simple ink is made by dissolving 8 grams or less of copper sulphate (blue stone) in a pint of water. A little gum or sugar should be added to prevent running. Invisible when dry, the ink turns pale blue when developed in the vapors of ammonia. Pour a few spoonfuls of ammonia into a saucer and lay the paper over it.

Israeli Pale Blue Secret Ink No. 2

Dissolve 124 grams of copper sulphate in one liter of distilled water to which has been added 80 drops of sulphuric acid. This ink is invisible when dry, but turns pale blue in ammonia fumes. When the ammonia has evaporated, it will disappear again, and reappear when the process is repeated.

Turkish (MIT) Black Secret Ink

The Turkish Spy Agency (MIT) has used this ink. Dissolve 80 grams of ferrous sulphate in a liter of distilled water, and add a few drops of sulphuric acid. It will dry invisible and come out black in the presence of ammonia fumes.

Gestapo Blood-Red Secret Ink

According to the Federal Office of Crime Investigation in Wiesbaden, Germany (Bundeskriminalamt), former Gestapo members are corresponding with each other using a secret ink made as follows. Mix 640 cc of distilled water with 350 cc of acetone and 4 grams each of phenolphthalein and caustic potash. Invisible writing made with this ink is developed with ammonia.

Austrian Black Secret Ink

After WWII, Austria was a hotbed of spying, due to its common borders with several countries and the presence of United States, British, French and Soviet agents. Austrian

citizens convicted for spying on behalf of foreign powers admitted that a great deal of the information sold to intelligence agencies was written with a 10% solution of nitrate of protoxide of mercury. Characters written with this ink are invisible, and turn black when moistened with liquid ammonia.

AN INK WHICH USES AMMONIA AS THE DISAPPEARING AGENT

Double Agent Red Secret Ink

An employee of the hush-hush US spy agency, the National Security Agency (NSA), was found to have relayed information vital to US national security to two employees of a foreign government, using the secret ink described below.

Dissolve 135 grams of ferric chloride in distilled water containing 20 ml of concentrated hydrochloric acid. Dilute to one liter. Try this ink, and if the writing is visible, dilute with more distilled water until the writing is invisible.

To develop, place sulphuric acid and potassium cyanide in a longnecked flask and hold the paper over the top. The writing will turn red when exposed to the sulphocyanide vapors (be careful — these fumes are very toxic). The message will disappear when exposed to ammonia fumes, and may be made to alternately appear and disappear by these two vapors.

APPEARING AND DISAPPEARING INKS

These inks make a visible message disappear and an invisible one appear in its place. A hidden message is written with the invisible ink and a completely harmless message which no one would think of stopping is written over it. When the second message is made to disappear, the first message appears.

FRENCH CLOAK AND DAGGER BLACK SECRET INK

The Service de Documentation Exterieure et Contre Espionage (SDECE), the French counterpart of the FBI, caught an Arab sheik using this ink to illegally copy French classified documents.

The invisible ink is a solution of sub-carbonate of potass. The visible ink is a mixture of sulphate of iron and infusion of galls, and the developer is a mixture of sulphate of iron, infusion of galls and sulphuric acid.

Write the secret message on paper with a solution of sub-carbonate of potass — the message will be invisible. Mix together equal parts of sulphate of iron and infusion of galls. Write the meaningless message with this mixture, which is

black. To develop the secret message, use the visible ink with a little sulphuric acid, enough to deprive it of color. Wet the paper with this compound. The acid will discharge the color of the visible message, and cause the invisible ink to appear black.

BRITISH BLACK AND BLUE SECRET INK

British intelligence developed this secret ink. It is a black ink that can be erased after reading, and can be developed again into blue writing if the information is needed again. The ink is made as follows:

100 drams of water containing a little gum

3.5 grams mixture of an alkaline solution of yellow prussiate of potash

3.5 grams magnesium carbonate

3.5 grams finely divided graphite.

The eraser is any suitable rubber eraser, such as India rubber. The developer is a solution of equal portions of iron alum and bisulphate of potash.

MAGICIAN'S APPEARING AND DISAPPEARING TRAVELING INK TRICK

Magicians have used this ink trick to obtain a very startling and clever effect. It involves a visible ink, a disappearing ink, an invisible ink, and a developer. Proceed as follows:

VISIBLE INK: Prepare a solution of equal parts of ferric ammonium sulphate and sodium ferrocyanide. With a clean pen, write a message on a sheet of white cardboard.

DISAPPEARING INK: While the visible ink is drying, prepare a solution of sodium carbonate and soak a piece of

blotting paper, the same size as the cardboard, in this solution.

INVISIBLE INK: Next prepare, in separate containers, a solution of sodium ferrocyanide and one of ferric ammonium sulphate. Now write the same message on another card with the ferric ammonium sulphate solution.

DEVELOPER: Impregnate or soak another piece of blotting paper, the same size as the first, in the sodium ferrocyanide solution.

TO PERFORM THE TRICK: Place the first card and wet blotter on an easel on the right side of the stage, and the second card on an easel of the left side. Tell the audience that you are going to make the message travel across the stage, then place the wet blotter over the cardboard on the right and press slightly on it as if you were rubbing it off. Remove the blotter and the message has disappeared. Go across the stage to the other easel and place the second sheet of blotting paper over the second prepared sheet of cardboard, rubbing the same way you did on the first. When the wet blotting paper is removed, the message will appear on the second sheet.

REAGENT SECRET INKS

Reagent secret inks are those in which the writing is developed by a substance used to ascertain the nature or composition of the ink by means of their chemical interaction. A message written in such an ink is invisible and will be affected only by certain specific reagents or a given group of chemical compounds. In order to develop such a piece of secret writing, the chemists of an intelligence service must apply in proper succession all of the analytic reagents. But obtaining the desired result requires lengthy manipulation and comes at the expense of the neatness of the document.

I have more than five hundred different reagent secret ink formulas in my files, far too many to list here. In fact, every chemical that will react with another chemical to produce a color will make a secret ink of this kind. But, of course, the ones I list are better than some of the others.

An ordinary atomizer, which can be purchased at any drug store, is ideal for developing the reagent secret inks. Be sure to clean it each time a new solution is used.

Following are the formulas for fifteen colored reagent inks:

(1) *Blue Secret Ink.* This ink is a solution of 53 grams of potassium ferrocyanide in 1 liter of water. The developer is a

diluted solution of iron sulphate applied to the invisible writing (after it has thoroughly dried) via sponge or aerosol. The developed writing will appear blue.

(2) *Light Blue Secret Ink.* This ink is a solution of copper sulphate. Develop the writing by spraying with a strong solution of ammonia water. The writing will appear blue.

(3) *Navy Blue Secret Ink.* To make this ink, dissolve 73 grams of cobalt nitrate in 1 liter of water. Developer is a strong solution of ammonia water. The writing will appear dark blue.

(4) *Brown Secret Ink.* This ink is a solution of 62 grams of copper sulphate in 1 liter of water. The developer is a solution of 53 grams of postassium ferrocyanide in 1 liter of water. The developed writing will appear brown.

(5) *Red-Brown Secret Ink.* This ink consists of 73 grams of cobalt nitrate dissolved in 1 liter of water. When writing is perfectly dry, develop by spraying with a solution of 53 grams of potassium ferrocyanide in 1 liter of water. The writing will appear a beautiful reddish brown.

(6) *Deep Red Secret Ink.* To make this ink, dissolve 68 grams of chloride of mercury in 1 liter of water. After the writing has dried, develop by spraying with a solution of 83 grams of potassium iodide in 1 liter of water. The writing will be deep red.

(7) *Red Secret Ink.* Write with a solution of 27 grams of iron chloride in 1 liter of water. Spray with a solution of sodium sulphocyanate to develop. The writing will be red.

(8) *Light Red Secret Ink.* To make this ink, dissolve 1 gram of phenolphthalein in 50 cc of alcohol and 50 cc of water. To

develop the writing, spray with a solution of 159 grams of sodium carbonate in 1 liter of water. The writing will be light red.

(9) *Yellow Secret Ink.* Write with a solution of 68 grams of chloride of mercury in 1 liter of water. Develop with a solution of 1 gram of caustic soda in 1 liter of water; this is a very weak solution, since a strong solution will burn the paper. The writing will be brilliant yellow.

(10) *Golden Yellow Secret Ink.* Make a solution by adding 1 dram of potassium bromide and 1 dram of pure copper sulphate to 1/2 ounce of clear water. This solution is nearly colorless; used on a yellow-tinted paper, it is completely invisible. Developed by heat, the writing is a golden yellow.

(11) *Violet Secret Ink.* Make this ink by carefully dissolving 20 grams of phenol (or carbolic acid) in 1 liter of water. Spray with a solution of 27 grams of iron chloride in 1 liter of water to develop. The writing will be violet.

(12) *Green Secret Ink.* This ink is a solution of 6 grams of sodium chlorate in 1 liter of water. When the writing is dry, spray with a solution of 14 grams of copper sulphate in 1 liter of water. The writing will be green.

(13) *Dark Green Secret Ink.* Make a solution of 73 grams of cobalt nitrate in 1 liter of water. When the writing is dry, develop by spraying with a solution of 53 grams of potassium ferrocyanide in 1 liter of water. It will be dark green.

(14) *Bright Green Secret Ink.* Write on tinted paper using a solution of 50 grams of copper chloride in 1 liter of water. The developer is a solution of 70 grams of cobalt chloride in 1 liter of water. The writing will be dark green.

(15) *White Secret Ink.* Write on dark colored paper (black or dark blue) with a solution of 61 grams of barium chloride in 1 liter of water. When the writing is perfectly dry, spray with the developer, a weak solution of sulphuric acid, 3 cc of sulphuric acid in 12 cc of water. (Sulphuric acid must be poured slowly and carefully in making this solution.) The developed writing will be white.

COAL-BLACK SECRET REAGENT INK

This is an example of the reagent secret inks used by counter-intelligence agents. Mix and dissolve 60 grains of gallic acid (trihydroxy-benzoic) and 10 grains of powdered acacia in 6 ounces of distilled water. The acacia used should not be so colored as to make the writing visible; the solution must not be darker than a pale straw color. After writing a message with this solution in the usual manner, let it dry without blotting.

The developer for this ink consists of 30 grains of ferrous sulphate dissolved in 8 ounces of distilled water. A good way to apply the developer is to saturate a blotter with it, then press it down on the writing. This produces lines without smears or running as brushing the developer on the writing is likely to do. This developer, applied to the writing, will bring it out in a pale greenish or bluish-black color at first. But with continued exposure to air, it will gradually darken until it is coal black. The writing is then permanent and can be removed only with a first-class eraser, either chemical or mechanical.

BLUE SECRET REAGENT INK

Klaus Barbie allegedly used this secret ink to supply information to American intelligence agencies during the 1960s. Barbie, a former Gestapo officer, had been employed

by the U.S. Army as an anti-Soviet intelligence agent in Europe in 1948. He is presently in prison in France awaiting trial on charges of having committed "crimes against humanity" during World War II. The ink consists of 1 level teaspoon of tartaric acid in 2 cups of water. The developer, a solution of ferric ammonium sulphate and water, is applied to the paper with a bit of cotton. The developed writing is blue.

KITCHEN SECRET BLACK INK

A prisoner planned and carried out his escape from Champ Dollon prison in Geneva, Switzerland, in collaboration with confederates on the outside with whom he corresponded using a secret ink. The ink was made from tea which he obtained while working in the kitchen. To make this ink, simply brew some very strong tea. The writing is developed with a blotter moistened with a solution of ferric ammonium sulphate.

KITCHEN SECRET PURPLE INK

Another ink was used by a convict working in a prison kitchen to correspond secretly with his gang on the outside, enabling him to escape. To make this ink, boil about a handful of rice in a pint of water. Before the rice is thoroughly cooked, strain off the water and use it as an ink. When dry, the writing will be invisible on white paper. Spray the paper with a solution of potassium iodide and the writing will appear with a purple color. This rice ink was the favorite means of secret communication between members of the Indian nationalist movement for independence from Britain.

PLO SECRET RED PRINTING INK

No one in the United States government is supposed to talk about the National Security Agency and what it does, but foreign diplomats in New York and Washington take it for granted that all of their conversations and diplomatic traffic are routinely monitored by the NSA. Knowing this, the PLO never uses the telephone or cable to transmit important messages. For covert communication, it uses secret inks, such as this one.

To make this ink, grind a small amount of phenolphthalein crystals into a dextrine-glycerine vehicle. This vehicle is a solution of canary-colored dextrine cooked into glycerine at a low temperature, together with a sufficient proportion of alumina (aluminum oxide) and opaque white to mask the slight cream color. When this ink is printed on white stock and allowed to dry, it is almost completely invisible. But when the printed sheet is dipped into a dilute solution of almost any alkali, such as washing soda, soda ash or caustic soda, the printing will immediately appear in a very striking brilliant red. Since washing soda is harmless and universally obtainable, this type of secret ink is quite popular with the PLO.

SECRET ANATOMY INKS

Writing secret messages on humans takes on a multitude of forms. The oldest known employment occurred in Roman times, when it was common to shave the head of a messenger, write a secret message, and dispatch him with his communication after his growing hair covered the writing. Today, spies use anatomy inks for secret writing and sketches on parts of their own bodies.

Secret Black Anatomy Ink

Used by Soviet spies to transmit atom bomb secrets, the

ink is tannic acid solution, and the developer is iron sulphate solution. Write with a small amount of tannic acid solution, say, on the back of the hand. When you place your hand in a basin of water containing a small amount of iron sulphate, the writing, invisible previously, will appear black.

Hitler's Secret Crimson Anatomy Ink

Adolph Hitler allegedly used this secret anatomy ink for sex games with Eva Braun. Eva would hide printed messages on various parts of her body, and Hitler would come to bed armed with an atomizer containing the reagent which would reveal the messages. The ink was a solution of sodium sulphocyanate, and the developer a solution of iron chloride. If you write on any part of your body with a solution of sodium sulphocyanate, the writing will be invisible, but will appear crimson when a solution of iron chloride is applied.

ISRAEL'S SECRET INK AND DEVELOPERS

Mossad may be the most skillful intelligence service in the world. So it is no surprise that the accomplishments of the Israelis with secret inks have earned them the grudging admiration of intelligence students around the world. That the Israelis time and again have been able to penetrate the world's inner sanctums is no accident. It is a triumph of careful organization and painstaking preparation by their chemists well versed in secret inks.

Mossad's knowledge of exceptional secret inks and developers used by the Soviet Union is the CIA's most valuable source of intelligence about the matter. I cannot reveal the information on developers and inks furnished the United States by the Israelis, since this is classified "top secret." However, the following will show some of the developers and an ink used by the Israelis.

REDUCTION DEVELOPER

Osmium tetroxide, or perosmic acid (H_2OsO_4), is a colorless crystalline compound which is reduced by organic matter, such as invisible inks containing carbon, producing osmium gray-black color. The coloration is permanent.

Apply a one-percent aqueous solution of the reagent with a brush to the invisible writing to be developed. Allow the paper to dry naturally; sunlight hastens the reduction.

SILVER NITRATE DEVELOPER

The best method of developing secret invisible writing on paper involves the use of a 10-percent solution of silver nitrate. This is applied in an extremely thin, uniform layer by passing the paper through two rollers moistened with the solution. The paper is allowed to dry, then exposed to ultra-violet, revealing the writing in a few seconds. (Ordinary sunlight will develop the writing, but takes longer to do so.) Such writing photographs extremely well and can be preserved for a year or more if kept in absolute darkness.

REDUCTION DEVELOPER

Certain invisible inks containing metallic compounds may be immersed in a bath of silver nitrate (one-percent solution) and a reducing agent, such as hydrogen sulphide, whereby a thin coating of silver is deposited on the invisible writing, which is thereby rendered visible.

ELECTROCHEMICAL DEVELOPER

Some inks used in secret writing are extremely dilute, containing no more than one part of the active agent in 50,000, or even 500,000 parts. When the Israelis examined samples of such inks, they detected organic compounds of silver of the so-called protargol type. Because of its extreme dilution, and because of the nature of the molecule of which it forms a part, the metal in this sort of ink is protected from ordinary developers.

The Israelis, however, finally discovered a reagent capable of revealing texts written with such enormously dilute solutions as those containing only one part of the active agent in 100,000 parts. So far no substance has been found capable of affording protection against this developer.

If a sheet of paper bears infinitesimal traces of certain metals deposited on its surface by writing on it with one of the extremely dilute invisible inks, and the paper is placed in a medium containing a nascent metal, then the latter will be deposited by electrolysis upon the previously-deposited metal traces (which are more or less good conductors), making them visible. Nascent silver (produced when silver nitrate and a reducing agent are combined) is the most easily used variety of this type of developer.

MOSSAD SECRET INK DEVELOPER

This developer is made with 4 grams of potassium iodide, .1 gram of iodine, 5 grams of sodium chloride, 2 grams of aluminum chloride, 3 milliliters of glycerin and 30 cc of distilled water. The aluminum chloride must be added little by little and the solution kept cool. If the aluminum chloride is added too rapidly to the solution of the other ingredients, it will produce a violent reaction. Utmost care must also be taken when crushing the aluminum chloride into fragments.

This developer is applied to a document with a pad of cotton wool. In about five minutes, the letters will stand out boldly, and will remain visible for some time. This reagent will reveal most invisible inks known to science. It has the disadvantage that accidental abrasions and other damage to the surface of the document, even if slight, will also be revealed in great detail. But, in practice, this is seldom a serious inconvenience. An advantage of this formula is that it leaves no tell-tale stains.

ISRAELI SPECIAL PROCESS SECRET INK

Agents of Mossad, as well as Aman and Shin Bet, make much use of a Special Process Secret Ink composed of one part napthol, twenty parts collodium, and sixty parts acetone.

The reagent used to develop the invisible writing requires two solutions. First mix 5 cc of sulphuric acid with 50 cc of nitric acid in a liter of water, and add one gram of sodium acetate. Next dissolve 50 grams of sodium acetate in 200 cc of water. Then mix 20 cc of this second solution with 100 cc of the first solution. Dip the entire sheet of paper in this mixture until all the letters appear. Afterwards, wash the paper in distilled water and dry it between sheets of blotter paper.

TEMPERATURE-SENSITIVE INKS

CAR BOMB TIMING (SECRET INK FOR TEMPERATURE-SENSITIVE PAPER)

A car bomb usually consists of 2 or 3 sticks of dynamite, a blasting cap and a length of fuse. Professional killers attach the fuse to the exhaust manifold. When the engine has run long enough, and the temperature of the exhaust manifold reaches 300 degrees, it will ignite the fuse. This does a thorough job of murdering, as it causes not only an explosion, but a crash as well.

Professional killers like to know how long the engine will have to run before the explosion will occur. So before the bomb is placed, temperature-sensitive paper is wrapped around the exhaust pipe of another car. The engine is started and the time required for the paper to go from bright red to decomposition is noted.

Paper impregnated with temperature-sensitive ink changes color when heated. It is bright red below 130 degrees F. At that temperature it begins to darken, becoming noticeably darker at 135 degrees. At 145 degrees the color is maroon. At 155 degrees the color changes to a light chocolate, then to a dark chocolate at 160 degrees. At 212 degrees it is black. Decomposition begins at 300 degrees.

This temperature-sensitive ink consists of 1 part (by weight) of cuprous iodide and 1 part of mercuric chloride ground to a fine powder and mixed with a thin, light-colored, non-acid oil or spirit varnish. It is applied to the surface of the paper with a brush.

TEMPERATURE-SENSITIVE INVISIBLE INKS

The most commonly used invisible inks seem to be those that are made visible by the application of heat. This is no doubt due to the ready accessibility of heat and its slight cost. Heat develops writing made with fluids such as cobalt salts, copper salts, lemon juice and other fruit and vegetable juices (formalin added to a fruit juice will somewhat inhibit the development of the writing by heat), milk, solutions of sugar, dilute sulphuric acid and urine. The writing should be done on unglazed paper, since all invisible inks will show on glazed paper. The best way to develop such writing is with a carefully regulated air oven, but a hot iron also gives good results. In some cases, the writing can be developed with a small amount of heat; a match, a lighted candle, a warm electric bulb or warm breath may be enough.

Invisible Ink Patent No. 1,423,246 (1922)

First, prepare two pounds of aqueous solution of ferric sulphate by soaking small flakes of ferric sulphate in cold water overnight. In the morning, the flakes will be a gelatinous mass. Stir a little to produce a homogenous mixture. Then add about 1 pound of syrupy phosphoric acid. Occasionally the addition of a little ferric ammonium solution is helpful.

Black Invisible Ink

This ink consists of a weak solution of nitrate of mercury. The writing becomes black with the application of heat.

Blue-Green Invisible Ink

Make a five or ten-percent solution of cobalt chloride in soft or distilled water. The writing will appear blue-green when developed.

Permanent Black Invisible Ink

Dissolve 1 part powdered sugar in 50 parts dilute sulphuric acid (1 part sulphuric acid and 17 parts water, i.e., commercial battery acid). The developed writing will appear in permanent black. This ink has the disadvantage of destroying the paper. It is best used with a quill pen, since the acid attacks metal, too. If a quill pen is not handy, a cheap gold-plated pen point on a fountain pen will do. It should be washed clean in water as soon as the writing is done.

Brown Invisible Ink No. 1

Dissolve 8 ounces of sulphate of copper and 8 ounces of bromide of potassium in 1 gallon of distilled water. Strain to remove any specks of dirt. This is a commercial formula for an invisible ink which turns brown with careful heating.

Brown Invisible Ink No. 2

Mix ammonium chloride (sal ammoniac) with 15 parts water. Writing becomes visible when held over a small flame.

Brown Invisible Ink No. 3

This ink consists simply of buttermilk (which works better than regular milk). If a clean pen is used, the writing will be invisible. Ironing with a hot flatiron is the best way to develop it.

Brown Invisible Ink No. 4

This ink consists of any of the following juices: artichoke juice, grapefruit juice, leek juice, cabbage juice or lime juice.

Characters written with any of these juices will become very visible when the paper is heated.

Brown Invisible Ink No. 5

This ink consists of 30 grams of sodium chloride dissolved in 100 cc of water.

Brown Invisible Ink No. 6

This ink consists simply of vinegar, which becomes very visible when heated.

Brown Invisible Ink No. 7

This ink is a strong solution of ferric ammonium sulphate (alum) in water.

Brown Invisible Ink No. 8

To make this ink, simply dissolve some chlorate of potash in water.

High Temperature Brown Invisible Ink

Characters written with lemon juice will become visible when the paper is heated. Add formalin to the lemon juice (use the commercial 40-percent solution of formaldehyde), and a higher temperature than usual will be needed to develop the writing.

Deep Reddish-Brown Invisible Ink

The ink consists simply of onion juice, and may be obtained by plunging the pen into a peeled onion. When dry, the writing is absolutely colorless. With the application of heat, such as from a lighted candle or match, the writing develops to a deep reddish-brown.

Tamper Information Invisible Ink

Some of the invisible inks developed by the application of heat will disappear again after cooling. But in order to determine if an unauthorized person has tampered with a document, the paper can be marked with signs which will become visible with heat and which will not disappear. For this purpose, a solution of equal parts of resorcinol and paratoluidin in 8 drops of water and 6 drops of sulphuric acid can be used. This produces pale red or light yellow lines which turn black or brown when heated.

Green Invisible Ink

To make this ink, dissolve 5 grams of chloride of nickel, 5 grams of nitrate of nickel and 10 grams of chloride of cobalt in 1 ounce of distilled water.

Indelible Invisible Ink

Dissolve 100 parts of alum in water and bring the solution to a boil. Add 100 parts of white garlic juice to the boiling solution, bring to a boil once again, then let cool. Once this ink is developed by heat, it cannot be effaced with moisture.

Red Invisible Lovers' Ink

If a weak solution of cobalt nitrate is used as ink, it will develop a beautiful rose tint when heat is applied. "Write invisible love messages in passionate-red invisible ink which only you and your lover can make appear and disappear. Protect your love life." So reads one pulp magazine advertisement offering this ink for sale by mail order.

Yellow Invisible Ink

Make two solutions by dissolving 30 grams of copper sulphate in 100 cc of water and 30 grams of sal ammoniac in 100 cc of water. Then mix the two solutions together.

Blue Printing Press Invisible Ink

One type of printing press ink consists of a heat-sensitive salt, such as cobaltous chloride, dissolved or ground into either a very pale-colored lithographic varnish or a vehicle made by cooking straw-colored dextrine into glycerine at a low temperature with continuous stirring to prevent burning of the dextrine. A considerable amount of cobaltous salt must be used to make the ink sufficiently concentrated to be practical. A sufficient quantity of alumina hydrate must also be ground into the ink. When this type of ink is applied to a white or slightly pinkish paper and dried, the printing is almost completely invisible. When the dried sheet is exposed to mild heat, the printed matter turns a light blue. It disappears upon cooling.

Children's Green Non-poisonous Commercial Invisible Ink

To make this ink, combine 1 part vinegar with 2 parts of saturated solution of sodium chloride. This is a non-poisonous invisible ink which children can play with safely. Heat makes the message appear.

Secret Postal Card Ink

This ink was used by a German posing as a neo-nazi to send information about cryptology and electronic warfare to the Soviets on postal cards. The ink is made with 1/2 ounce of oxide of cobalt (cobaltous oxide), enough muriatic acid to dissolve the oxide of cobalt, 4 ounces of water, and 1 dram of mucilage of gum acacia. Heat makes the message appear. Cold makes it disappear.

Cigarette Moocher Secret Ink

Use this ink to send a message to your friends who are always borrowing cigarettes because they are too cheap to buy their own. It consists of sulphuric acid in water. Using a gold-plated penpoint, write the word "moocher" on some cigarettes with this ink. Let them dry thoroughly. Give one to your cigarette-borrowing friend. When he lights it and

starts smoking, the letters of the word "moocher" will appear one at a time as the heat reaches them.

ULTRAVIOLET INKS

ULTRAVIOLET RADIATION SECRET INKS

"Black light" is the popular term for ultraviolet radiation beyond the visible range of light. If you filter out the white light from sunlight or a strong white light, the remaining black light rays will activate certain secret inks by causing them to floresce.

This phenomenon has been put to use in various ways. Many laundries are using black light and invisible marking inks. If you leave a dance hall or a race track, and wish to be allowed to re-enter later without paying a second admission, you can have an invisible mark made on the back of your hand; the mark glows under black light. Law enforcement officers can mark ransom money with an invisible substance which will show up under ultraviolet light. A thief may be identified using black light, if he has unwittingly picked up traces of invisible anthracene powder from, say, a lock previously sprinkled with it. Of course, intelligence agencies use black light to reveal and read secret messages.

Over 3,000 substances can be used for the secret inks visible under black light, but some of these will activate only under light of a specific wavelength. (The wavelength of light is measured in angstrom units.) For this reason, some

intelligence units use blacklight lamps producing the exact wavelengths of light necessary to activate specific secret inks.

Following are some of the available black light lamps which can be used for developing secret messages (best results are obtained in a darkened room):

1. Argon — 2 1/2 watt — 3900 angstroms — activating range 4 inches.

2. Black Bulb — 250 watt — 3650 angstroms — activating range 30 inches. An excellent light, but it gets too hot; do not let it burn continuously.

3. Tubular (Red-purple), 5 different lamps — 3300 to 3600 angstroms — wattage: 4, 6, 8, 15, and 30 — activating range (in inches): 10, 14, 18, 30, 40.

4. Tubular (Special phosphor), 4 different lamps — 3600 angstroms with filter — wattage: 6, 15, 30, 40 — activating range (in inches): 14, 30, 40, 40. These lamps work best with a filter of ordinary blue glass.

5. Mercury, 6 different lamps — 3600 angstroms — activating range 20 to 40 feet — wattage: 100 (clear), 100 (red-purple), 100 (flood), 100 (spotlight), 200 (clear), 400 (clear). All but the 100 watt red-purple require special heat-resisting filters. The 400 watt clear is the best light for range and coverage.

6. Cold quartz — 10 watt — 2550 angstroms — activating range 10 inches.

Ideally, one's black-light equipment should include both short and long wavelengths. A few secret inks show up brightest under short rays, such as those produced by the cold-quartz lamp. But a great deal can be made florescent at 3600 angstroms. It is on or near this wavelength that most secret inks floresce the strongest. The tubular lamps are ideal for producing this wavelength, though the less expensive black bulb is also an excellent light source for a 3600 angstrom wavelength. Even the little argon lamp will do the trick. But no one light is suitable for every secret ink.

All of the lamps listed above are harmless to eyes and skin, except the cold-quartz lamp. The extremely short rays from this light must be kept away from the body. But the cold-quartz lamp is used mainly for a few special inks.

INVISIBLE TYPING CARBON PAPER

A florescent substance is coated on paper in a base of several percent drying wax and an organic solvent. The florescent substance may either be organic, for instance, anthracene, or inorganic, for example, zinc sulphide phosphor. Put the coated paper in a typewriter instead of carbon copying paper and you can type invisible messages readable only under ultraviolet light. Dark paper which has been padded to prevent impressions is preferable for the final message.

BIG BROTHER BLUE SECRET INK

To make this ink, dissolve quinine sulphate in a small amount of water to which a few drops of sulphuric acid has been added. This solution, applied to paper and allowed to dry, is invisible in sunlight but shows a blue florescence under ultraviolet light.

This ink is being used for the invisible coding of supposedly confidential questionnaires so that the individual respondent can be identified although he does not give his name. By falsely promising confidentiality in this way, research firms, detectives and others are able to trick people into providing information about personal matters such as income or drinking habits. This is an ominous form of snooping by "Big Brother."

NORWEGIAN SOFT BLUE SECRET INK

During the trial of five Norwegians accused of spying on NATO installations in Norway on behalf of Moscow, a prosecution witness, a former Soviet secret agent, testified that the accused had sent information to Russia using this secret ink. It consists of an aqueous solution of pyramidon. The messages are written with a toothpick dipped in the solution. The developer is ultraviolet light.

YORKVILLE DEEP VIOLET SECRET INK

Esculetin may be used as an invisible writing fluid. White paper written on with this fluid will appear blank in ordinary light. But the writing will be visible under ultraviolet light. During World War Two, a letter from the Gestapo to German-Americans in the Yorkville neighborhood of New York City was intercepted. A secret message written with this invisible ink urged German-Americans to commit minor acts of sabotage such as leaving the lights on and the water running in their homes. They were also instructed to carry condoms filled with graphite, to be dumped in engine oil systems, or sugar, to be put in gas tanks.

SOVIET CIPHER BRILLIANT BLUE SECRET INK

During World War Two, U.S. intelligence agents recovered the charred remnants of a Soviet code book from a battlefield in Finland. However, the Russian code involved hidden five-digit groups of numbers as well as the five-digit groups listed in the code book. American code breakers were stumped until the confidential numbers were discovered,

written in secret ink, in documents stolen by the FBI from the office of the Soviet Purchasing Commission in New York City.

To make this ink, dissolve anthracene (purified by recrystallization from pyridine) in benzine. Write on paper with this solution, then let dry. The message will be invisible in daylight, but will show a brilliant blue florescence under ultraviolet light. (Crude anthracene, when applied in the same way, is almost colorless in daylight and green under ultraviolet light.)

BRIGHT BLUE SECRET LAUNDRY MARKING INK

An invisible laundry ink which floresces a bright blue under ultraviolet light is made by dissolving beta-napthol in water and alkalinizing with sodium hydroxide. This ink is good for writing on rayon, cotton and other kinds of cloth.

When a spy is arrested, any papers he is carrying are usually tested for invisible writing. But he may evade detection, merely being questioned and released, if he carries no confidential information on paper. For this reason, a spy may write any such information on his shirt, using this secret laundry marking ink.

To develop such secret writing on cloth, dip the cloth in a 10-percent solution of silver nitrate to which a little acetic acid has been added. Dry in a dark room, then expose to ultraviolet light until the writing attains maximum brightness, and photograph it.

For such photography, one needs a common black light tube and an ultraviolet filter Number 18A to be placed over the camera lens. (Since ultraviolet light tubes emit both ultraviolet radiation and visible light, the 18A filter is necessary to stop the visible light.) Place the lamp so that the ultraviolet light comes as nearly as possible at a right angle to the object being photographed. The photography must be done in a dark room. The time of exposure will be as much as

20 or 30 minutes. A special ultraviolet photometer will give the exact time of exposure.

BRIGHT YELLOWISH-GREEN SECRET INK

Allegedly used by Saudi Arabian slave dealers to correspond with their agents, this ink consists of a solution of 1/2 gram of uranyl nitrate and 50 cc of water. Under ultraviolet light, it floresces a bright yellowish-green. It should not be used on foods or other items intended for human consumption.

PRISON BLUE SECRET INK

In 1916, a man made the most daring of all prison breaks, an escape from the Sing Sing Death House. Despite censorship of mail, the convict was able to organize the escape by sending messages written with secret ink on the backs of letters to a partner on the outside. By feigning illness and complaining of headaches, he got headache powders which he used to make an invisible ink.

Those headache powders were composed of acetyl salicylic acid, which is now sold in a white crystalline compound called aspirin. An aspirin dissolved in water makes an invisible writing fluid which leaves no perceptible trace. But under an ultraviolet lamp, the writing becomes florescent and begins to glow.

PRISON URINE SECRET INK

Two men were charged with conspiracy to effect the escape of prisoners from the House of Detention in New York City. Writing on the back of a 4-page letter, using urine as an invisible ink, a prisoner had given detailed instructions for the break, and had drawn three diagrams of the prison.

Although urine has a slightly yellow to amber color, it is invisible on certain types of writing paper. It will floresce under ultraviolet light. (Saliva, however, will not.)

BRIGHT GREEN SECRET INK

This ink consists of barium sulfhydrate (white, rhombic-shaped crystals) dissolved in hot or cold water. Ultraviolet light is the developer.

SECRET FIRE INK AND SHIELD

A bogus Soviet defector attempting to penetrate American intelligence used this ink and shield to hide secret messages in his correspondence. To make the ink, mix acetic acid and the white of an egg, then add mercury and stir well. Although this ink is florescent under ultraviolet light, the shield covers the entire sheet of paper with a brilliant blue florescence under ultraviolet light, thereby concealing the secret writing. To make the shield, dissolve anthracene, purified by recrystallization from pyridine, in benzine. Use a No. 6 flat sable brush to cover the letter with the shield. Dip the brush into the shield, then stroke it on the mouth of the bottle to remove any surplus. Do not let the brush go dry, but dip it into the shield occasionally. Use it sparingly until the whole letter is covered. Do not saturate the paper. Hold the paper until it is completely dry and odorless. With this shield concealing the secret message, the only way to read it is to burn the paper. Then the secret writing will appear unburnt, in white letters.

SECRET PASS-OUT INKS

Pass-out inks are those inks used in stamping the hands of people who have been admitted to various entertainment

establishments, so if they leave the premises, they can be readmitted without having to pay admission again. It is a relatively easy matter for one person to pay admission, go outside, and copy his stamp onto others peoples' hands. To prevent this, two secret pass-out inks are used. Both inks are invisible in ordinary light, but show up under ultraviolet light.

A saturated aqueous alcohol solution of beta methyl umbelliferone may be used as an invisible florescent stamping ink. A little glycerin or other suspending or thickening agent may be added. When used with a clean rubber stamp, the ink is invisible, but shows up blue under ultraviolet light.

An alcoholic solution of turmeric is prepared by washing the ground root powder with water and discarding the washings. Prepare with alcohol and filter through filter paper. Use the clear filtrate for the ink. Invisible in ordinary light, it will show a yellowish florescence under ultraviolet light.

VAPOR INKS

SECRET MERCURIAL INKS

Four different mercurial inks can be made using the following four substances: gold chloride, platinum chloride, iridium chloride and palladium chloride. In each case, the chloride is dissolved in water to make a weak solution. Writing on white paper done with any of these four solutions will be invisible. If the sheet of paper is held over a dish containing mercury, the metal in the writing solution will then appear in dark tints. If the developed writing is then placed in contact with a second sheet of paper previously sensitized with the same solution used for the writing, the writing will be reproduced line for line on the second sheet. Writing developed in this manner is very clear and distinct.

PLO SECRET VAPOR INK

Eight PLO members confessed to Egyptian security authorities that they had plotted to blow up United States and Israeli embassies and kill Egyptian officials in order to establish a radical Arab regime. They had used secret vapor inks to transmit information. The Israelis notified the

Egyptian authorities how to decipher the secret vapor inks, after interrogating another PLO member who had been picked up by the Mossad.

According to this man, magazines were used to transmit messages. He said that page-staples were removed from copies of magazines and messages inscribed in the extreme margins. Then the magazines were re-stapled and mailed.

The ink used for writing these secret messages is made by dissolving 1 part of lead acetate, .1 part of uranium acetate and .1 part of bismuth citrate in 100 parts of water, then adding, drop by drop, a solution of sal ammoniac (3 ounces of ammonium chloride and 1 pint of water) until the whole becomes transparent. A few drops of gum arabic are then mixed with this solution. To develop a secret message written with this ink, expose it to the fumes of sulphuric acid. This will immediately turn the writing dark brown. The developed writing will fade away in a few minutes, but can be renewed with very dilute nitric acid.

IODINE VAPOR SECRET INK DEVELOPER

A very good method of developing secret writing on paper is by means of iodine fumes. During World War II, an iodine vapor bath was an essential appliance in every censorship office. This apparatus consisted of a tin oven in which iodine was maintained at the lowest temperature at which it would remain vaporized. A suspected letter was put into the bath. Iodine tends to settle on rough surfaces, so when the letter was removed after a few minutes, minute crystals of iodine had settled along the tiny rough edges created by the scratches of a nib.

Iodine vapor baths have been perfected so that they can now develop any form of chemical "ink." No writing with any known fluid that has ever so faintly marked the surface of a sheet of paper can escape the delicate tracings of the iodine vapor. However, this method doesn't work if the writing has been protected with a paper bath.

In 1961, Fidel Castro's government imprisoned a young man who had taken up arms against the revolution. For a few years, he wrote letters with secret inks describing Cuban prison as hell. Unable to get any chemicals, he improvised these inks by using whatever was handy, such as water, onion juice, saliva and urine. However, two phony political prisoners planted in his cell blew the whistle on this man. Since then all suspected mail of political prisoners is censored by iodine vapor treatment. In some cases, the letters are photographed, then made invisible again and sent to the addressee.

Some experts recommend the use of hot iodine fumes for developing secret writing. Crystalline iodine evaporates at normal room temperature. If a little heat is applied to it, the evaporation is greatly increased. There are quite a few kinds of apparatus on the market for heating the iodine and allowing the fumes to condense on the surface of the paper. When the fumes come in contact with the cold paper, a thin coat of iodine spreads over the entire surface. All stains on the paper, especially greasy ones, as well as impressions and certain secret inks, will show up more or less brown. If the process continues, eventually the whole paper becomes dark brown and nothing can be distinguished. Therefore, the time during which the iodine is allowed to act on the paper should be just long enough to bring out the writing, and not long enough to allow the paper to darken. Because the action of hot iodine fumes on paper is very quick and harsh, it takes much training to be able to obtain good results with this method.

Another method is to use only cold iodine fumes. In this process, a quantity of iodine is spread over the bottom of a flat glass container and the paper to be examined is placed in the container about 1/2 inch above the iodine. The paper rests on two pieces of wood, or even better, two pieces of glass porcelain, placed on the bottom of the container. The paper should not touch the iodine. The container is then covered and the paper left inside it for a few minutes. About

five minutes of this treatment will usually develop all writing.

Since iodine changes from a solid to a gas at room temperature, the developed writing will soon fade away. This is advantageous for some purposes, such as examining an intercepted letter without the knowledge of the receiver.

However, it is often necessary to show the writing to a court, in which case it is necessary to preserve the writing. Several different ways of doing so have been invented, including treatment with gallic acid, nitrate of silver, etc. Most of these methods require considerable skill to achieve good results, but there are two that are relatively simple.

The first consists of putting the paper between two glass plates and gluing the edges together.

The second method consists of treating the developed writing with a solution of 1 gram of chloride of palladium and 1,000 cc of distilled water. In this case, the paper is allowed to float with the writing face down in a flat glass container filled with this solution. (The solution may also be applied with a piece of cotton or a small atomizer similar to those used by artists to treat charcoal drawings.) If there is writing on the paper due to an indelible pencil or indelible ink, a small quantity of alum or tannic acid should be added to the chloride of palladium solution. (If these ingredients are added, the resulting solution should not be poured back into the original chloride of palladium solution.)

When treated with the chloride of palladium solution, the writing slowly turns dark brown. As soon as the color is dark enough, the treatment is discontinued, the superfluous chemical is washed away with water, and the paper is allowed to dry slowly. The writing will be preserved indefinitely. However, if it is later necessary to remove it, a weak solution of ammonia is used.

To prepare iodine-developed writing for photography, treat it for slightly less than a minute with a solution of .1

gram of palladium chloride, .25 gram of tannic acid, .25 gram of alum, .5 cc of dilute (10 percent) hydrochloric acid and 100 cc of water. Then thoroughly wash the paper in a stream of water and let it dry. With this treatment, the developed writing becomes brown or black and can be readily photographed.

AUSTRALIAN SECRET VAPOR INK

The following secret vapor ink is used by some agents of Australian military intelligence. The ink consists of a solution of 8 grams of arsenic trioxide (arsenous acid) in 1 liter of water. The invisible writing is developed by exposure to vapors of hydrogen sulfide. Hydrogen sulfide is usually prepared by the action of dilute hydrochloric or sulfuric acid on ferrous sulfide. The gas is collected by the displacement of air. Chemical companies sell saturated hydrogen sulfide solutions. Aitch-Tu-Ess cartridges for generating hydrogen sulfide may also be purchased from them.

SECRET BUDDHA INK

Buddha Ink consists of a ten-percent solution of lead acetate in distilled water. Writing done with this ink turns black when exposed to hydrogen sulfide vapor.

How is Secret Buddha Ink used?

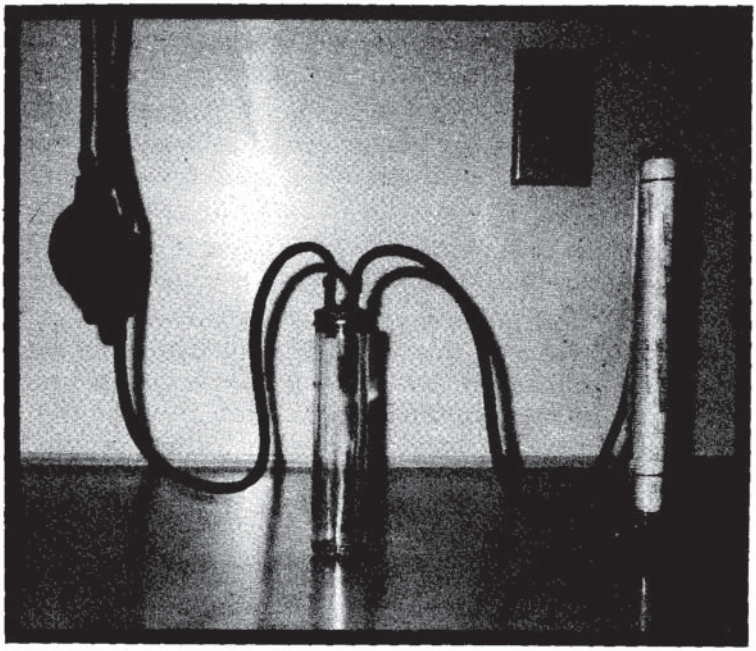
At a fair, park, carnival, street corner, flea market or any crowded outdoor place, a man or woman stands on a box or platform wearing an Oriental costume to attract a crowd. A lecturer or talker standing beside the Oriental offers to tell fortunes (or, if fortunetelling is not permitted, to write a personal letter of advice) for a dollar.

A pad of blank papers is passed to the spectators and the talker asks people to put their initials on the blank paper so they can get the sheet intended for them. The initialed sheets are removed from the pad and placed in a transparent glass

tube, which is placed in the upper breast pocket. The tube protrudes from the pocket and is visible at all times. After a few seconds, the formerly blank sheets of papers are removed from the glass tube and each one contains a different fortune or piece of advice.

The trick is that the fortunes are written on the apparently blank sheets of paper *beforehand,* using the Secret Buddha Ink. The invisible writing is then developed by exposure to hydrogen sulfide vapor while inside the glass tube.

The apparatus for generating the hydrogen sulfide fumes can be constructed by duplicating the arrangement shown in the accompanying photograph. A graduated glass cylinder was used in the picture because it can stand. But, in actual practice, a long glass tube is used.



The apparatus consists principally of a long glass container with two copper tubes soldered through the cap. Connected to these copper tubes are two lengths of rubber tube, one of which is connected to a rubber bulb. The other goes to the inside of the jacket breast pocket.

This apparatus is hidden inside the jacket or costume. A saturated solution of hydrogen sulfide (which can be purchased from any chemical house) is placed in the glass container which then is put into one pocket, while the bulb goes into another.

The rubber tube is extended through the inside lining of the breast pocket, which is sewed inside so that it will hold the glass tube over the protruding rubber tube. Pour one inch of the saturated solution of hydrogen sulfide into the glass container. Replace the cap tightly to prevent any fumes from escaping. When you squeeze the bulb, the air displaces the hydrogen sulfide fumes, forcing them into the tube leading to the breast pocket, where they will develop the papers in the transparent glass tube.

Do not place more than 3 papers in the glass tube at one time. For best results, the papers should be damp, but not wet. Keep them wrapped in a damp towel before use.

After removing the developed papers, immediately put the glass tube back in the breast pocket. It is now partly filled with hydrogen sulfide vapor which can be used in developing the next papers.

Because of the odor, this gimmick is not suitable for use indoors in small rooms. But it is a money-making success outdoors or in large, air-conditioned stores. Here the odor can be camouflaged by burning incense or putting perfume on the jacket.

VANISHING INKS

Characters written with the inks in this chapter will vanish, doing away with all documentary evidence of any kind in the hands of the recipient. Those who sign bills of exchange, promissory notes, leases, etc. in vanishing ink are able to evade their contractual obligations, although if they are caught, such fraud is a criminal act.

News reports several years ago stated that Aristotle Onassis was being investigated by French authorities on charges that he signed a contract with vanishing ink. The complaint was thrown out of court.

Dark Brown Vanishing Ink

1 part lead salt
1/10 part uranium acetate
1/10 part bismuth citrate
100 parts water
a few drops of sal ammoniac
a few drops of gum arabic
fumes of sulphuric acid
dilute nitric acid

Dissolve the lead salt, uranium acetate, and bismuth citrate in the water. Then add, drop by drop, a solution of sal ammoniac until the whole becomes transparent. Mix in a few drops of gum arabic. This ink will fade away in a few minutes. To make characters written in this ink visible, expose them to the fumes of sulphuric acid, which turns them immediately to a dark brown. The characters will fade away again in a few minutes, but can be renewed by a slight washing with very dilute nitric acid.

BLUE SECRET CODE INK

Add one gram of sodium ferrocyanide and one gram of ferric ammonium sulfate to two teaspoonfuls of water in a test tube. Shake the mixture until both salts have dissolved. This will form a blue colored ink. Using a clean pen, write with this ink on a sheet of white paper.

When the ink has dried, dip a wad of cotton in a solution prepared by dissolving 8 grams of sodium carbonate in two teaspoonfuls of water. Swab the writing with the cotton and it will disappear.

A secret message can be disguised as an ordinary message if you use ordinary blue ink of the same shade as the above disappearing ink. Part of a word or sentence can be written with the vanishing ink and the rest with the ordinary ink. The agent swabs the message, and a new, secret message now appears.

BLACK VANISHING INK

Boil 30 grams of tannic acid in 4 ounces of brandy. Add 30 grams of cupric sulfate and 30 grams of sal ammoniac, and cool the mixture. Then dissolve a little gum arabic in it. This black ink will vanish in 24 hours.

BLACK VANISHING INK NO. 2

Boil 30 grams of tannic acid in 2 ounces of commercial nitric acid. (CAUTION: nitric acid is corrosive, causes severe burns on contact, and is deadly if inhaled!) Add to the mixture, when cooled, some gum arabic and a little sulphuric acid. This black ink will vanish in a few days.

ANY COLOR VANISHING INK

If you mix sulphuric acid with common ink of any color, the writing will eventually disappear by corroding the paper. If you use equal parts of sulphuric acid and ink, the paper will be corroded in one month.

BLUE VANISHING INK FOR LOVE LETTERS

This is the ink that formerly sold in Paris under the name "Encre pour les Dames" (ink for ladies). The ink consists of an aqueous solution of iodide of starch. When soluble starch is dissolved in a tincture of iodine, a blue-black color is produced. This ink is especially intended for love letters. In four weeks, characters written with it vanish, along with whatever promises the writer might have made. Many a "man of letters" wishes he had them back!

GLAZED PAPER VANISHING INK

1 part iodine
1 part potassium iodide
24 parts mucilage of acacia
100 parts water

Dissolve the potassium iodide in half the water, then add and dissolve the iodine. Add the rest of the water and mix in the mucilage. This ink can be used on glazed paper and will vanish in time.

RED VANISHING INK

To make a red vanishing ink, mix 1 gram of phenolphthalein to 50 cc of ammonia. Writing done with this ink will vanish when exposed to air for a length of time.

VANISHING INK NO. 9

5 parts tincture of iodine

2 parts arrowroot

100 parts water

Mix the arrowroot and water and boil together. Let cool and stir the tincture of iodine. This ink is good on any type of paper and will vanish after a period of time.

VANISHING INK NO. 10

95 parts dextrin

5 parts iodine

10 parts sulphuric ether

5 parts alcohol

10 parts water

Mix the alcohol and ether, and dissolve the iodine in the mixture. Stir in the dextrin. Dry the mixture in a cool dark place. When you want to use it, dissolve enough of the substance in water to make the required amount of ink. Writing will vanish in time.

POISON INKS

BULGARIAN POISON PEN INK

A Bulgarian defector was waiting for a bus in London when a man in the crowd jabbed him with the tip of his umbrella. The defector had been given a poison injection by an agent of Durzhauna Sigurnost (Bulgarian intelligence), and he died shortly thereafter.

The poison used to kill the defector can also be carried in a pen and injected into a victim by colliding with him "accidently." (The pen point has a minute opening and leaves no puncture trace.) The "ink" is made by separately dissolving 9 grams of Platinum (ic) Chloride and 1 gram of Iridium Chloride in as little water as possible, then mixing them together.

The CIA, the KGB and the overseas hit men of the Mossad (Israeli intelligence) include an assortment of these poison pens in their armories.

RUSSIAN "INSTANT HEART ATTACK" INK

The Russian KGB has perfected a pen that sprays a 100-percent solution of hydrocyanic acid in the target's face,

contracting the victim's blood vessels and causing instant cardiac arrest. A few minutes later, the heart vessels of the corpse return to normal, producing symptoms similar to those of a heart attack. As a result, the fact that a crime has been committed may escape detection. The only evidence is the bitter almond odor, which soon dissipates.

INSTANT KILLER POISON INK

Trained covert agents use the Instant Killer Poison Ink Pen. It contains an "ink" made by dissolving 33 grams of potassium cyanide in 1 liter of water.

The Instant Killer Poison Ink poses a difficult problem to police and medical examiners because it produces symptoms similar to those of a massive heart attack. Thus, it may not be realized that a crime has been committed, in which case, no autopsy will be performed. However, modern laboratory techniques can readily detect this poison, thereby unmasking an intended homocide coverup. The pen, which looks like a normal fountain pen and is carried in the shirt or coat pocket, does not write. A few drops of "ink" squeezed from the barrel will kill quickly. It has a faint almond-like odor which is not discernible, however, in an alcoholic drink.

NAUSEA INKS (FOR BARTENDERS)

Sometimes a drunk will try to push other customers around, or otherwise cause trouble. When the bartender tries to evict the guy, he starts to struggle and fight. The bartender then can use either of the "inks" described below.

These inks are used with a fountain pen, since that type of pen has a reservoir in which the ink can be concealed. The toilet doors are locked and marked "Out of Order." The bartender pretends he is writing up the guy's check, and secretly adds one of these inks to the drunk's next drink.

Nausea Ink No. 1 is Ipecac syrup. One fluid ounce is concealed in the fountain pen and added to the nasty drunk's next drink. This will cause vomiting within 20 minutes. Since the toilet is locked, the drunk must leave the premises to vomit, and this takes all the fight out of him.

Nausea Ink No. 2 is X-Prep Liquid, a highly effective bowel evacuant. It is applied to the drunk as above. This ink will cause an immediate overwhelming desire to evacuate the intestines, and takes the bluster out of any nasty drunk.

MICKEY FINN INK

Mickey Finn Ink, concealed in the reservoir of a fountain pen, can be surreptitiously put in a victim's drink, rendering the unsuspecting drinker unconscious. It consists of an elixir (alcohol solution) of pentobarbital. Pentobarbital is a controlled drug (trade name: Nembutal) and is dispensed only by prescription. A doctor will prescribe it upon request to anyone who complains of insomnia. In an alcoholic drink, it is very potent; it takes effect in 15 to 30 minutes and works for 3 to 6 hours. It can, of course, be used for various nefarious purposes, such as blackmailing the victim with compromising photos taken while he is unconscious.

INCENDIARY AND PYROTECHNIC INKS

SECRET FIERY INK PEN

Professional saboteurs and arsonists created the Fiery Ink Pen. It looks harmless, but burns like a blast furnace and destroys itself. It will start a fire which will completely consume a building, if not controlled in time.

The lower half of the barrel of a fountain or ballpoint pen is filled with a mixture of 1/3 potassium chlorate and 2/3 sugar. A small lead tube, filled with sulphuric acid and sealed with a cork at each end, is placed above this mixture. When the sulphuric acid eats its way through the bottom cork, a single drop falling into the mixture of potassium chlorate and sugar causes an intense heat explosion of approximately 2,000° F., sufficient to ignite surrounding combustible material.

The whole technique of the arsonist is concentrated on establishing an alibi. Direct ignition with matches is not very common because the fire would start immediately and he could be seen leaving the building. However, the Fiery Ink Pen is a kind of time fuse. By experimenting with various thicknesses of cork, the arsonist can time the fiery blast almost to the minute. At the necessary time, he will walk into the doomed building, drop the pen in an appropriate spot, then leisurely walk away.

The owner of the building himself can do the job. A common method is to leave a coat behind with the pen clipped to the inside pocket when he leaves for the day. Hours later, a wall of flame will envelope the establishment. Meanwhile, the owner has established an alibi by dining with friends.

SECRET FIERY INK BOTTLE

Some arsonists use a safer method to start fires. A fire bug bragged that the biggest fire he ever set, burning down a warehouse, was done with a bottle of laundry ink and a box of soap powder. An innocent looking bottle of laundry ink dries up and catches fire if the cork comes loose or air holes are put in the stopper.

The laundry ink is made by dissolving nitrate of silver in ammonia, with a little gum arabic or dextrose added. When such an ammonia-silver compound evaporates, the remainder is the highly explosive nitride of silver (AgN_3). If the cork comes loose or a porous stopper is used, the ink dries up, and the remaining explosive compound is ignited by the presence of gum arabic or dextrose. To set a fire, a bottle of ink is placed on a radiator or steam pipe, or is taped to the side of either. A box of soap combined with gasoline is used as an improvised incendiary device.

SECRET VIOLENT FIERY INK BOTTLE

An even more violent type of fiery ink is an ink bottle filled one-third with sulphuric acid and two-thirds with gasoline. (The acid is added to the gasoline a drop at a time; the gasoline is not to be poured into the acid.) The bottle is closed with an airtight cork.

Dissolve 57 grams of potassium chlorate and 114 grams of sugar in 2 liters of hot water. Saturate a desk blotter with this solution. When dry, place it on a desk.

When ready to use, the ink bottle is inverted and placed on the blotter. The mixture of acid and gasoline will eventually eat through the cork stopper and will react violently with the blotter (coated with potassium chlorate and sugar), causing an explosion which will generate intense heat and fire.

(Mixing these chemicals is dangerous, and the hazard is even greater if you are inexperienced. Protect your eyes with goggles, and be extremely careful.)

SECRET PYROTECHNIC STAGE INK

Add one tablespoon of potassium nitrate to one-third of a wine glass of water, then add a little powdered gum arabic. Stir the mixture until all the ingredients are thoroughly dissolved.

Write a word or name on a heavy piece of cardboard, using plenty of this solution, making the letters very heavy, and connecting each letter. After the solution dries, bring a lighted match or cigarette or a spark, in contact with any portion of the writing. The dried solution will immediately catch fire, and the word or name will appear in burning letters. The effect can be enhanced and made more dramatic by turning out all the lights before igniting the writing on the cardboard. When the lights are turned back on, the word or name can be seen burnt in the cardboard.

SECRET PYROTECHNIC COMMERCIAL PRINTING INK

A similar ink is being marketed commercially and is used in printing on cardboard or paper in large batches. Water glass (a solution of sodium silicate) is mixed with a powder composed of 5 percent sulfur, 5 percent rosin and 90 percent saltpeter. The mixture can be used as a printing compound to create invisible images which can be revealed by the touch of a lighted cigarette.

GAMBLERS' SECRET INKS

MARKED CARDS OR READERS

Just as there has been a continual contest between the makers of weapons and the inventors of defensive armor-covering, so has there also been a lengthy contest between playing card manufacturers and professional card sharks. While the latter have been seeking to concoct a secret ink with which to mark their cards without spoiling the varnish covering, the former have been trying to frustrate the sharks' efforts by compounding a glaze which will spoil such trickery. Formerly, some card manufacturers were successful, and it was known that some cards, such as "Bee" playing cards, were unmarkable. Now, however, there are secret inks which will mark any card. Professional card sharks buy such secret card marking inks from gambling supply houses, which sell do-it-yourself kits. A one ounce bottle (8 drams) costs $200.

For blockout, dot or line work, the blockout inks listed below are very satisfactory. These will last indefinitely, and a drop is sufficient to mark an entire deck. The Yellow Pages list manufacturers and dealers who can supply all necessary aniline dyes, and chemical houses who can supply all the required chemicals.

Following are the chemicals used in the card marking inks:

Denatured alcohol. This is alcohol that has been adulterated so as to make it unfit for drinking, without destroying other properties useful for making secret inks.

Liquid phenol solution. Dissolve 20 grams of phenol (carbolic acid) in a liter of distilled water. Phenol is a colorless crystalline solid with a characteristic odor. It is extremely poisonous. The bottle should have a glass stopper, since liquid phenol will damage ordinary stoppers. Liquid phenol can be purchased in chemical houses. There are three grades: reagent (the best), laboratory grade, and 5-percent aqueous solution.

Glycerin. Also known as glycerine or glycerol. There are three grades: U.S.P., reagent and laboratory grade.

Salicylic acid. This is a white crystalline compound of which one acetyl form is known as aspirin.

Oxalic acid. This is a poisonous white crystalline compound.

Rose water. This is a fragrant preparation sold by chemical houses and made variously by the distillation of rose petals.

Gum mastic.

Gum sanderac.

The following dyes and dyestuffs are also used in making card marking inks: Rhodamine Base, Bismark Brown Y Base, Spirit Nigrosine SSB, Victoria Blue B Base, Methyl Violet 2B Base Concentrate, and Victoria Green WB Crystals.

SECRET RED BLOCKOUT INK

Blockout inks penetrate the surface and mark cards with line, scroll, or blockout work. They will produce a perfect job, and will not flash, fade, or rub off. The ingredients for Secret Red Blockout Ink are: 5 ounces of denatured alcohol, 4

ounces of liquid phenol, 3 grams of Rhodamine Base dye, 2 grams of Bismark Brown Y Base dye, 9 grams of gum sanderac, 9 grams of gum mastic and 32 drops of glycerine. Place the ingredients in a bottle and shake thoroughly to dissolve the dyes and gums. Let it set for 48 hours.

SECRET BLUE BLOCKOUT INK

The ingredients for this ink are: 5 ounces of denatured alcohol, 4 ounces of liquid phenol, 3 grams of Spirit Nigrosine SSB dye, 1 gram of Victoria Blue B Base dye, 1/2 gram of Methyl Violet 2 B Base Concentrate dye, 9 grams of gum sanderac, 9 grams of gum mastic and 32 drops of glycerine. Again, place the ingredients in a bottle and shake thoroughly to dissolve the dyes and gums. Let it set for 48 hours.

Blockout Work

In blockout work, the appropriately-colored Blockout Ink is used to block out or change slightly the design on the card. "Bee" decks are supposed to be mark-proof, but certain diamonds can be made larger or smaller by blocking out. Enlarged diamonds are preferred by stud poker players. Two combinations are made, one reading from ace to deuce, the other, the most used in stud poker, from ace to eight.

Blockout Inks can also be used for line work, in which dots or lines are added to the back design. This is used for stud poker or any other game in which only a small part of the back is exposed. It is also used for draw poker or any game in which only the top card is shown.

Blockout Inks are also used for marked edge work, which is done only on cards with a white outer margin, the combination being developed by thickening the line between the margin and the back design at certain points. Marked edge work reads from ace to deuce, but does not show the suit.

To apply either Blockout Ink, spread the ink out on a piece of glass, work it up until it forms a smooth paste, stroke the brush (No. 0 or No. 00) to a fine point, then apply the ink to the card. If the ink shows up dark, stroke the brush out more. Let the card dry for at least 10 minutes, then briskly polish the marked spot, and the whole surface of the card, with a wad of cotton dipped in powdered soapstone.

Although all cards are printed in dark shades, some of them have a somewhat lighter shade than the others. For marking these cards, a blender is necessary to lighten the shade of the blockout ink. The blender is made with the same ingredients as the ink, except for the dyes. Place the ingredients in a bottle and shake well to dissolve the gums. Add a few drops of the blender to a small amount of the ink until the right shade is obtained.

BLUE SHADING INK (Stock solution)

Blue Shading Ink is made with 5 ounces of denatured alcohol, 3 ounces of liquid phenol, 1 gram of Spirit Nigrosine SSB dye and .25 gram of Victoria Blue B Base dye. Dissolve the dyes in a bottle and label it "stock solution." Put one ounce of denatured alcohol in another bottle (a 1-ounce bottle will do) and add 32 drops of the stock solution with an eyedropper. Mix thoroughly and label this "working ink."

RED SHADING INK (Stock solution)

Red Shading Ink is made in the same way as the blue, but with the following ingredients: 5 ounces of denatured alcohol, 3 ounces of liquid phenol, .5 gram of Bismark Brown Y Base dye and .75 gram of Rhodamine Base dye.

Shade Work

Shading ink is applied to the back of cards with a No. 0 or 00 brush. Shading ink may either be applied to a small

portion of the card, or to the whole of the back with the exception of one spot. The latter requires very fine shade work.

Shade work may be put on so fine that even the cheat who uses it may have a hard time locating it at first. But he knows where he put it, and constant training of the eye makes it easy for him to see it when the untrained eye will overlook it entirely.

There are two ways to discover shade work. The first is to lay the cards on the table and look at them from a distance of 5 feet. Shade work shows up better at a distance than close up. The other method is to hold the cards at eye level, then tip them back and forth looking for blotches or any other irregularity on the back. However, perfect shade work is almost impossible to discover.

SECRET MONTE TELL OR CHINK INK PAPER

Secret Chink Ink consists of a piece of prime quality carbon paper (red carbon paper for red-backed cards, blue for blue-backed cards), waxed on a small card which can be carried in the vest pocket. Although graphite has been used as a Chink Ink, carbon paper is a more delicate tool. You can touch the carbon with the fingernail only. This leaves a thin line of daub on the rim of the fingernail which, when pressed against the card, transfers to the surface only a short, thin line of color, no bigger than a typographical dash mark (-). When a skilled card cheat has no opportunity to switch a marked deck into play, he uses Chink Ink, which can be applied during the game. (Chink Ink is also known as Monte Tell since it is commonly used in games of 3-card monte.)

SECRET CUTOUT INK

Some cheats, lacking the skill of an expert, add white areas to the card-back design by bleaching, or by using a sharp

knife to scrape minute areas of ink from the design. The professional, however, uses this secret cutout ink to add white areas to the design, when marking cards. This ink, which is actually an ink remover, chemically removes the color from the surface of the card, leaving it perfectly white.

To make the secret cutout ink, dissolve 1 ounce of salicylic acid in a mixture consisting of 2 ounces of denatured alcohol and 2 ounces of liquid phenol. After applying it to the surface of the card, remove dissolved ink with a wad of cotton. A good deal of repolishing of the card back has to be done to restore the card to its original finish, since a dull spot appears where the ink has been removed. Repolish with a wad of cotton dipped in powdered soapstone.

SECRET LUMINOUS INK

Cards marked with luminous ink do not bear any mark visible to the naked eye, but when viewed through eyeglasses with ruby ray red lenses, or through a visor made of dark red celluloid, the mark is large and distinct. Since it looks suspicious to wear red-colored glasses or a red visor while playing cards, the cheat will have an optometrist make a pair of tinted contact lenses. But amateur cheats are the only ones who use Luminous Ink; a professional would never think of trying it.

To make the Secret Luminous Ink, dissolve 1 gram of Victoria Green W B Crystals dye in 4 ounces of denatured alcohol. This is the stock solution. Now, put 2 ounces of denatured alcohol in a 2 ounce bottle and, using an eyedropper, add 32 drops of the stock solution. Shake the bottle to mix thoroughly. Using a No. 0 brush, apply the ink only to the part of the card back which is colored red. If you apply it to the white part of the card, it will be visible. Do not use too much of the Luminous Ink on the brush. If you don't get it on heavy enough with the first application, go over it again.

INVISIBLE PROCESS INK

This is strictly an amateur's cheating ink which can only be used outdoors in the daylight, since it shows up under electric lights. To make it, dissolve 63 grams of oxalic acid in a liter of rose water. This tends to give a precipitate if it becomes too cold. If this happens, place in warm water to liquify the ink.

Using a fine brush, apply a drop to the place selected for the mark. Let it remain there for 35 to 45 seconds, depending on the hardness of the enamel. Then pick up the moisture with a clean white blotter, allow the ink to dry for 10 minutes, and polish the card with a cotton wad dipped in powdered soapstone.

A slight irregular blur will be produced which constitutes the mark. While this mark can be seen from a distance of several feet across a room, it cannot be observed close up under daylight. The cheat reads the cards when the light shines on the tilted backs.

SECRET INK TO CHEAT BOOKMAKERS

This ink can be used on any color paper with perfect results. Invisible when first written, it will come up clear and distinct in twelve minutes without the use of heat or chemicals. First introduced in the East, this ink has been used to fleece thousands of bookmakers by getting them to accept bets on races that have already been run and the winner known.

A bettor gives his bookie a wagering slip with the name of a horse in the third race. Since the second race has just started, the bookie accepts the bet on the third race. What he doesn't know is that the bettor has written the name of the

winning horse in the first race on the same slip in secret ink. At the end of the day, the bookie examines the betting slips and there are now two horses on the said slip, with one a sure winner! (Smart bookies, when they accept a bet, protect themselves by recording on the betting slip the time the bet was made.)

This secret ink is made by combining 5 grains of silver nitrate, 10 grains of powdered gum arabic, and enough distilled water to make one ounce. The ink should be kept in a dark bottle and used with a glass or quill pen.

PAST POSTING SECRET INK (Oxidation)

This ink is used the same as the previous ink to cheat bookies. This secret ink appears under the influence of oxidation, which takes place when it combines with the oxygen in the air. The ink is a solution of 80 grams of ferrous sulphate and 10 grams of tannic acid in 1 liter of distilled water. When these substances are mixed, a black precipitate is obtained. Alternately add single drops of hydrochloric acid and sulphuric acid until the precipitate is dissolved, leaving a clear, colorless liquid which turns black as a result of the oxidizing action of the atmosphere. The ink must be protected from air by having the bottle stopper coated with vasoline.

SUCKER BET SECRET INK

This is a bet which appears to give the taker the best of it, but does just the opposite. You pick the victim and bet him he is color blind. Thinking this is an opportunity to make a few bucks at your expense, he will take the offer. Handing him a piece of blue paper, you tell him to close his hand over it and tell you the correct color. Of course, he will say, "Blue." But when he opens his hand, the paper is pink.

Soak a small piece of paper in a solution of cobalt chloride and dry it. The paper will have a blue color, which will change to pink, if held in a closed hand for a few seconds.

SUCKER BET SECRET INK NO. 2

If the dupe is still game, pour some water in a glass and let him look at it. Then cover the glass and ask what color the water is. He'll tell you it's transparent. But you bet him that it is white ink.

Dissolve a little Hypo in about a pint of water. Put this solution in a glass pitcher. Put a few drops of sulphuric acid in a wine glass. Pour some of the Hypo solution into the wine glass and show it to the victim. Cover the wine glass with a cloth. In a few seconds, the liquid will change to the color of white ink.

SECRET WATER INKS FOR BAR BETS

The props for these bets are four sheets of paper towel and clean pen points (toothpicks will do). A cooperative bartender will give you a glass of water. Bet that you can write in four different colors on four different sheets of paper, using only water as an ink. Say that you will get four sheets of paper towel from the washroom to use as writing paper. The four sheets you use are prepared in advance and concealed on your person or in the washroom.

Mix together equal amounts of tannic acid and ferric ammonium sulphate in the dry state, then rub this powder onto a piece of coarse-grained paper towel lying on a flat surface. Your hands must be perfectly dry, or a black spot will appear. Write with a toothpick dipped in water, and the writing will appear as if black ink had been used.

Mix together equal amounts of ferric ammonium sulphate and sodium ferrocyanide, then follow the same procedure.

The writing will appear as if blue ink had been used. Mix together equal amounts of ferric ammonium sulphate and sodium salicylate, then proceed as before. The writing will appear as if written with red ink. Finally, using copper sulphate, proceed as before. The writing will appear as if brown ink had been used.

LUMINOUS INKS

HUSTLER'S LUMINOUS SECRET INK

W.C. Fields wasn't the only person to believe that you should never give a sucker an even break. Using this luminous ink, hustlers can take advantage of others. The hustler produces an envelope containing a letter which he insists he can read in total darkness. If the victim accepts the proposed bet, he loses, because the letter is written with a luminous ink, and can only be read in the dark.

To make this luminous ink, put 30 grains of phosphorous and 1/2 ounce of oil of cinnamon in a test tube. Mix well, cork tightly and dissolve by means of a gentle heat (water bath). Wear safety goggles when heating the ink.

LUMINESCENT SECRET INK

(large quantity for commercial purposes)

Mix 7 pints of cottonseed oil and 1 pint of oil of cassia, add 14 ounces of yellow phosphorous and dissolve by careful gentle heating in a water bath. Handle the phosphorous with care as it is explosive. Any design drawn with this ink, when seen in the dark, will appear with a phosphorescent glow.

Luminous ink such as this can be used to duplicate some of the supposedly supernatural effects produced by so-called spiritualist mediums.

SECRET LUMINOUS LOVER'S INK

This ink contains two ingredients — 1/2 dram of white or yellow phosphorous and 4 drams of oil of cinnamon (cinnamic aldehyde). Mix these together, cork well and heat gently in a hot water bath until they are thoroughly mixed. (Phosphorous is usually kept under water in cans because it ignites on contact with air. It is poisonous and the fumes from a fire are very toxic.)

This ink is being advertised and sold in joke and novelty stores. The magazine ad reads: "Men, write a love letter to your girl friend that can be read only in the dark! The letters appear like words of fire! The darker the room, the more brilliant the letters appear. Very simple to use...write as with any ordinary ink. $5.00 a bottle."

CHEMILUMINESCENCE INK

This is not an invisible ink, but an "ink" which emits light when brought in contact with water. It consists of 1 part of 3-amino-phthalhydrazide (approximately 90 percent), 1.9 parts of sodium perborate, 5 parts potassium ferricyanide and 5 parts trisodium phosphate. The ink is prepared by grinding each of the ingredients to a fine powder, drying them at 40° C, then blending them in a powder mill. Ideally, the mixed ingredients should then be formed into tablets or cakes with a binder. When brought in contact with water, the chemicals react and give off a greenish-blue light.

This ink is sold as a novelty item in a plastic tube that is full of chemicals which start to glow when you bend it and break a glass tube of water inside. Chemicals that create a

bright glow when dropped on water have many possible uses for seaman and trans-oceanic fliers. Among such uses are marking the surface of the water for a plane making an emergency night landing at sea, showing life boats or life rafts to planes searching for them in the dark or giving a "seamark" to aid the navigation of either ships or planes. Chemiluminescence ink is used on a large scale by smugglers to facilitate rendevousing in the dark with boats carrying the contraband goods.

The formula for chemiluminescence ink is the subject of Patent 2,420,286 issued to three chemists. None of the preceding statements should be construed as a recommendation of any use, manufacture or sale that may infringe on any patent without authority or license from the owners of such a patent.

MAGIC TRICK INKS

SECRET INK MAGIC

The science of secret inks readily lends itself to the production of so-called magical effects. From time immemorial secret ink tricks have been the standby of many magicians.

The following secret ink trick requires a pitcher and seven glasses. Pour enough clean water into the pitcher to fill the seven glasses, then dissolve a small amount of tannic acid in it. Glasses 1 and 3 are left empty. Glasses 2 and 4 are prepared by adding a few drops of iron chloride to each. Put about 10 drops of oxalic acid solution in glass 5. Add ten drops of ammonia water to glass 6, and about a teaspoonful of sulphuric acid to glass 7.

Tell the audience that the pitcher is a magical one, which will pour out water, red ink or black ink, as you command it. Starting with the first four glasses, command the pitcher to fill the first glass with water, the second glass with black ink, the third glass with water and the fourth glass with black ink. When filled with water from the pitcher, the first and third glasses will simply contain water, as commanded, while the second and fourth glasses, containing iron chloride, will appear to contain black ink, also as commanded.

Return the contents of these four glasses to the pitcher. Now command the pitcher to pour black ink in the first four glasses, water in the fifth and red ink in the sixth. Fill six glasses from the pitcher: the first four will appear to contain black ink, the liquid in the fifth will look like water, and that in the sixth will appear to be red ink.

Pour all the contents of all six glasses back into the pitcher. Command the pitcher to pour red ink in the first six glasses and water in the seventh. Fill all seven glasses from the pitcher. The liquid in the first six will be the color of red ink, while that in the seventh will appear to be water.

Return the contents of all seven glasses to the pitcher. Now command the pitcher to pour water only. Fill all seven glasses from the pitcher. The liquid in all seven will look like ordinary water.

BLOWING THE COLOR OUT OF SECRET RED INK

In this trick, the magician blows the color out of red ink.

To make the secret red ink, a small fragment (about the size of a match head) of sodium hydroxide, or caustic soda as it is sometimes called, is placed in a test tube half filled with water. Now half fill a glass or porcelain dish with water. An old soup plate is excellent for this purpose. Dip a glass rod into the caustic soda solution in the test tube, then dip the rod into the water in the soup plate. Add phenolphthalein solution a drop at a time to the liquid in the soup plate until it turns red, but use no more than four or five drops of the phenolphthalein solution. Now you're ready to perform the trick. Blow gently on the surface of the liquid and the red color will disappear.

MAGIC SECRET INKWELL

This trick requires two pieces of white paper, a full inkwell and an opaque ink bottle containing lycopodium

powder. Roll the first piece of paper into a cylinder and dip it into the inkwell. Let the audience see that it is covered with ink. This shows that the inkwell really contains ink. Now tell the audience that you are going to add some ink from the ink bottle to the inkwell to replace the ink that has just been used up. Instead of adding ink to the inkwell, however, you secretly sprinkle lycopodium powder from the ink bottle on the surface of the ink in the inkwell. Now roll the second piece of white paper into a cylinder and dip it into the inkwell. It will come out as white as when it went in, because the lycopodium powder prevents the ink from touching the paper. A slight shake removes the powder clinging to the paper and it can be given to spectators for inspection.

WATER INKS

SECRET WATER PRINTING INK NO. 1

This is an invisible printing ink which is developed with water. It can be used to print novelty advertisements or greeting cards with messages which appear out of nowhere when wetted with water.

The ink consists of magnesium carbonate ground into a slightly heat-bodied Chinawood oil (Tung oil) or a light-bodied, water white linseed oil lithographic varnish. The inclusion of certain hygroscopic chemical salts, such as calcium chloride, will frequently enhance the effect, tending to whiten the ink when it is moistened, thus increasing the contrast between the darkened paper and the ink.

Colored antique papers are best for this work, since they will absorb a considerable amount of water, and their slightly rough surface hides the printing well. The dye in the paper must not be soluble in water. When the sheet is immersed in water, the paper absorbs the water and becomes darker in color, except for the portions covered by the water-resisting colorless ink. The printing therefore appears as a light tint against the darker paper.

SECRET WATER PRINTING INK NO. 2

A 5-percent solution of paraffin in a mixture of equal amounts of xylene and tetrachloroethane is used for printing waterproof invisible characters on paper or textile. The printing becomes visible when moistened.

SECRET WATER INKS NOS. 3-8

Following are the formulas for six more water inks which can be used in writing with a pen. All are developed by being wetted with water.

No. 3. This ink is a solution of 3 ounces of cobalt chloride and 1 ounce of glycerin in 64 ounces of distilled water.

No. 4. This ink is made with 1 ounce of oleic acid, 5 grains of tannic acid and 5 grains of ferric sulphate. The developed writing is blue-black.

No. 5. To make this ink, add 1 dram of linseed oil to 2 1/2 ounces of ammonia water U.S.P. and shake until it is saponified and makes a smooth, even emulsion. Then add 12 1/2 ounces of distilled water in portions, shaking well after each one. The ink must be well-shaken when the pen is dipped. Otherwise, a trace of oil might separate and stain the paper. The writing, developed by wetting the sheet, disappears again on drying, but can be developed again with another immersion. This may be repeated a number of times.

No. 6. Dissolve gum camphor in whiskey or dilute alcohol. Writing must be done rapidly.

No. 7. This ink consists of nitrate of bismuth dissolved in water.

No. 8. This ink consists of 1 part of cellulose nitrate (.25-5 percent) and 90 parts of cellosolve acetate (99.75-95 percent).

MISCELLANEOUS INKS AND PAPERS

SECRET EGG INK

This ink has been used by British informants within the IRA to communicate the location of arms, ammunition, and explosives, as well as other secret information.

The message is written on the outside of shells of hard boiled eggs. Outwardly unmarked, the eggs travel with fresh eggs ostensibly going to market. The British government agents break open the shells of the hard boiled eggs and the message appears on the white of the egg.

The ink is a mixture of alum and vinegar. The alum can be in the form of an antiseptic pencil used for shaving cuts. It is mixed with vinegar to the consistency of ink. The message is written on the outside of the hard boiled egg shell, where it is invisible. A few hours later, the message can be read on the white of the egg.

The iron in the alum (ferrous ammonium sulphate) is carried through the shell by the commercial vinegar (acetic acid), which is just strong enough to penetrate the eggshell (calcium carbonate). The white of the egg contains sulphur which combines with the iron to form iron oxide, which is black.

FRUIT INK

The Australian Security and Intelligence Organization (ASIO) is its country's top national security agency. A KGB "mole" was discovered inside the ASIO. The Soviet spy was expelled after an investigation revealed that he had leaked information by writing on fruit with invisible ink. This man always went shopping for fruit before reporting for duty and kept a bag of fruit on his desk.

Writing on fruit in invisible ink can be developed with carbonate of lead powder. It is applied to the fruit by dusting, sprinkling, spraying, or applying with a soft brush. In the above case, secret writing was found on apples, pears, plums, oranges and bananas. Other fruits, especially those having a hard rind such as watermelons or pumpkins have been used for secret writing.

SECRET FURNITURE INK

One of Japan's best known companies was charged with conspiring to steal trade secrets from an American company and convey them to Japan. An executive was arrested when it was discovered that he was shipping furniture to Japan with the closely guarded trade secrets of the American company written inside the drawers with secret ink.

The ink consists of 50 cc of water, .2 grams of cinchonine and a few drops of sulphuric acid. If used to write on wood or durable cellulose products, it flouresces a bright blue under ultraviolet light. If the secret writing is done on metal or leather, aluminum powder may be used to make it visible. However, copper powder is preferable to aluminum powder as a developer. It is heavier and, therefore, not so apt to flow around, a tendency which has been found to be a problem in using aluminum powder.

WATERPROOF PAPER AND INK

To render cardboard or paper waterproof without harming or altering the paper, first heat 1 pound of sheet gelatin in 10 pints of water until it is dissolved. Then immerse the cardboard or paper in the hot solution. When it is saturated, drain and then immerse in a solution of 1 pint of formaldehyde and 5 pints of water. (Note: You can use Formalin, the commercial name for a 40-percent water solution of formaldehyde.) After removing it from the formaldehyde solution, the paper should be dried in the air until the odor of formaldehyde disappears. If a yellowish tint to the paper is acceptable, the waterproofing can be done in a single solution made by dissolving 6 ounces of sodium or potassium bichromate in the gelatin solution.

Waterproof ink can be made by mixing a little glue with ordinary ink. After waterproofing the ink, it is possible to wash a drawing with soap and water without the ink running. Messages written with the waterproof ink can be carried on one's person while swimming.

SECRET ARTIFICIAL WATER MARK

Suppose you receive the following note from a contact who failed to show up at the arranged meeting place: "I am so closely watched that I cannot see you as I promised. But I will meet you tomorrow in the park with the documents." Is this a trick? The writing may be in your contact's own handwriting, but what if he has been tortured or otherwise forced to write the note in order to lead you into a trap? You look for the secret artificial water mark that you both previously agreed to use in all correspondence. If the water mark isn't there, it is a trick.

Mix ceruse or some other white color with gum traganth. Wet the writing paper and place a dry sheet over it, then write using a hard blunt-pointed pencil. The water mark is

invisible when the paper is dry, but can be clearly seen in the light when the paper is wet.

FIREPROOF INK AND PAPER

The hush-hush U.S. spy agency, the National Security Agency (NSA), classifies somewhere between 50 and 100 million documents a year. Documents classified as TOP SECRET are written with the following fireproof ink on fireproof paper.

10 grains platinic chloride

30 grains India black ink

2 grains powdered gum arabic

2 drops carbolic acid

1/4 ounce water

To make fireproof paper, ordinary paper is treated with a fireproof solution, such as the one detailed below.

2 ounces ammonium sulphate

1/8 ounce ammonium alum

1/2 ounce boric acid

5/8 ounce sodium borate

enough water to make one pint

Mix all the materials in a suitable vessel and heat just warm enough to dissolve the solids, while stirring well. Pour out in a shallow pan and float the writing paper on the surface. The paper will soon curl, and in time will come back flat on the surface, after the pores of the paper are entirely impregnated with the fluid. The paper is then lifted from the fluid by picking up one corner with a clip or pin and hung up to dry. If the paper curls when it dries, it can be pressed with a warm iron.

COVERT PENS

Is the pen mightier than the sword?

The previous chapters show quite clearly that the pen plays a vital role in many important activities. In this chapter, I will describe some covert and exotic pens, revealing how they are used by agents, terrorists and criminals. Although hundreds of covert pens exist, I will only describe those in my own collection.

BLOW GUN PEN

A blow gun disguised as a standard ballpoint pen can be used as a silent weapon to shoot poisoned or tranquilizer darts. See Figure 1.

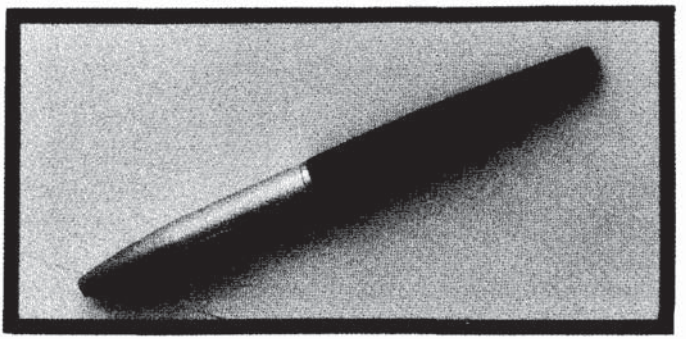


Figure 1

TERRORIST BOOBY-TRAP PEN

This ordinary looking plastic or metal retractable ballpoint pen is a lethal explosive bomb. It's a booby-trap pen containing a 1 1/2 inch battery, a blasting cap and molded plastic explosive. A spring is installed in the cap and when the plunger is depressed, the battery power fires the blasting cap, which in turn sets off the plastic explosive. The blasting cap is a short capsule of copper, 1/4 inch in diameter and 1 inch long, containing a small quantity of explosive. The putty-like plastic explosive is 1 to 6 inches in length, depending on the size of the pen. Regardless of its size, this pen is a powerful bomb and can kill or sever the hand of the person who unwittingly presses the plunger. See Figure 2.

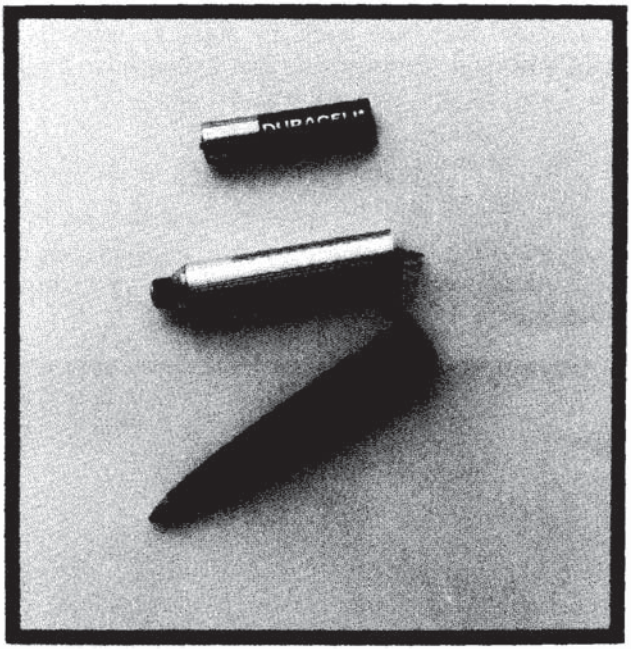


Figure 2

BUG DETECTOR PEN

This disguised bug detector pen is used when one is uncertain whether or not a confidential conversation is being secretly recorded by the other party. If the person you are talking to is carrying a "body bug" (an electronic eavesdropping device) for secret recording, the pen will show this via a light-emitting diode. The power supply is a 9-volt battery. See Figure 3.

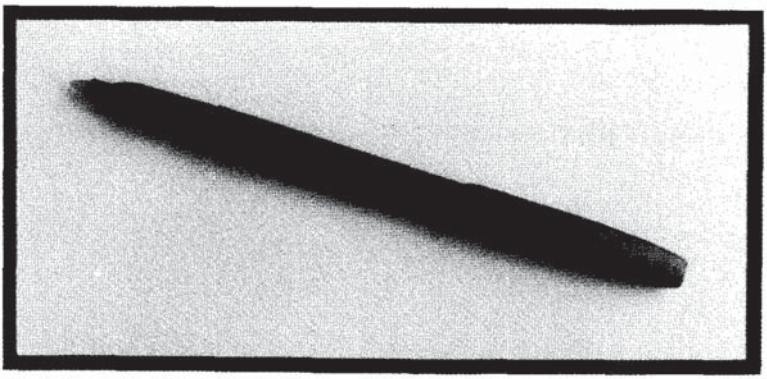


Figure 3

DAGGER PENS

A dagger pen may not be mightier than a sword, but it can be a deadly weapon.

There are at least four types of dagger or knife pens. The first type has a spring-loaded, 4 1/2 inch hardened steel, pointed, rounded, tapered blade which locks out, ready for action when the pocket clip is pressed. The pen barrel is knurled for a non-slip grip.

The second type looks like a standard felt-tip pen. It contains a 3 1/2 inch poniard blade made of hardened and tempered steel. It is quickly ready for use just by pulling it apart. The needle-pointed, awl-like tool is securely housed in the cap of the pen.

The third type of dagger pen looks like an ordinary Parker ballpoint pen, but hidden within is a razor sharp blade.

The fourth type of dagger pen opens up like a balisong knife to reveal its blade.

Figures 4a and 4b show all four types closed and open.

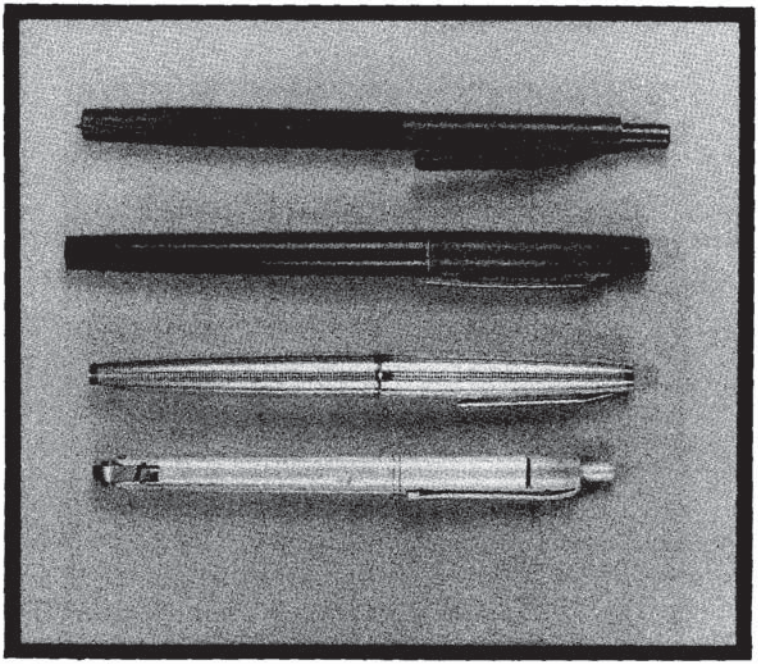


Figure 4a

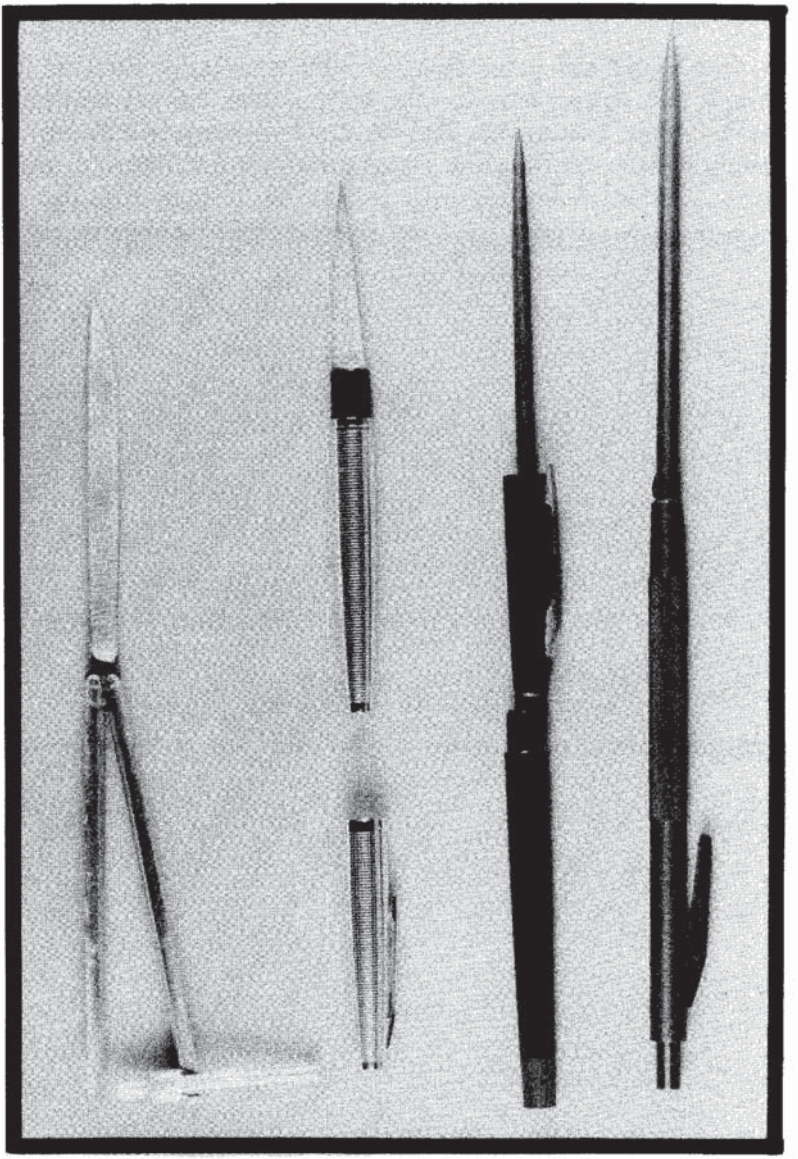


Figure 4b

TEAR GAS PEN

This is an efficient device for defense against attacks. If one is set upon violently, the built-in tear gas cartridge is activated by means of a push button in the cap and the tear gas is emitted, driving the aggressor away. See Figures 5 and 6.

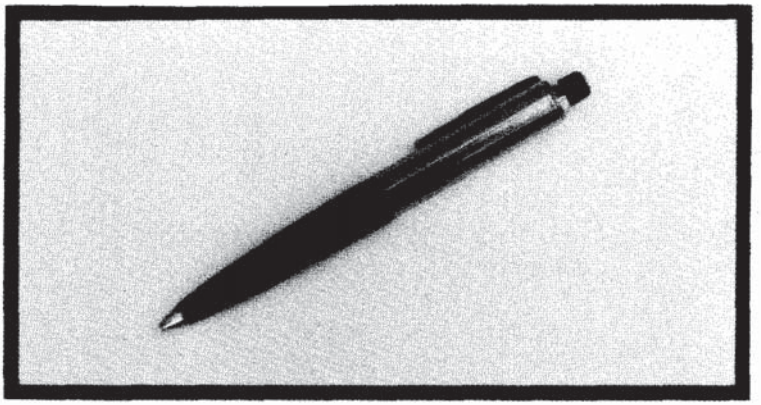


Figure 5

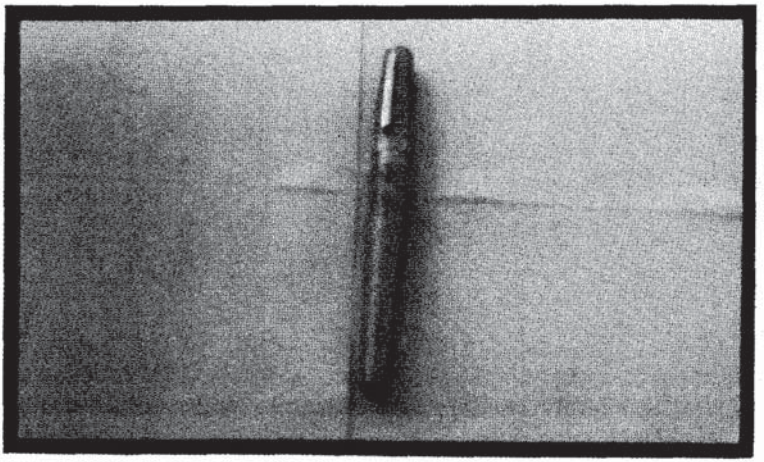


Figure 6

HYPODERMIC PEN

This is an ordinary looking fountain pen containing a small receptacle of glass, metal, rubber or plastic into which a poisonous or tranquilizing liquid is drawn. The pen has a sharp hollow needle for injection of the liquid under the skin when the plunger is pressed. See Figures 7 and 8.

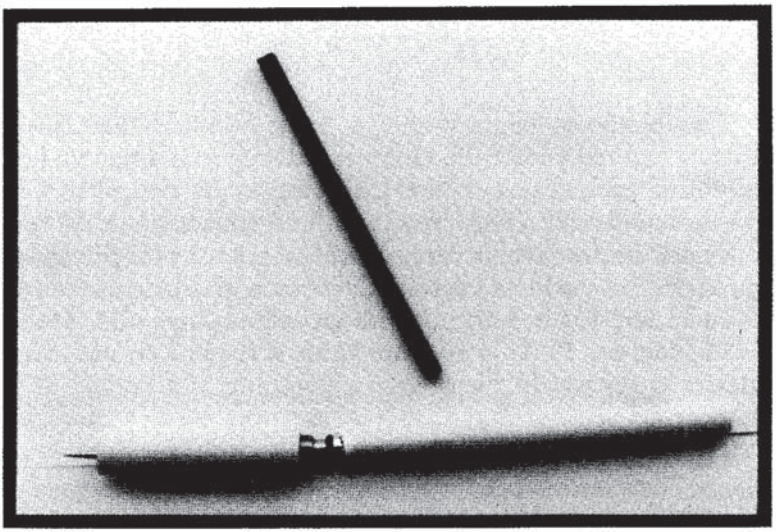


Figure 7

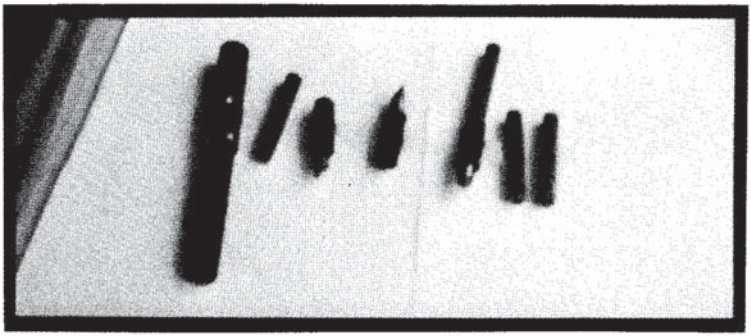


Figure 8

MINIFLARE SIGNALLING PEN

This nice little pen consists of a launcher and cartridges. Each cartridge has an aluminum case which contains a propellant and a colored miniflare (red, white or green). The cartridges are screwed onto the pen launcher with a simple trigger mechanism. The pen is used for distress signalling.

DETONATOR PEN

This ballpoint pen contains a black celluloid tube filled with powdered potassium chlorate and sugar. A small vial of sulphuric acid, sealed with a cork stopper, is also placed in the celluloid tube. This is a time delay mechanism. When sulphuric acid, which is very corrosive in nature, eats its way through the cork, it reacts violently with the potassium chlorate and sugar, burning with an intense heat of 2,000 to 3,000 degrees F. This is more than sufficient to detonate plastic explosive. In the case of a bombing of a Boeing 727, authorities decided that such a device was used in order to bring the bomb onto the plane undetected. See Figure 9.

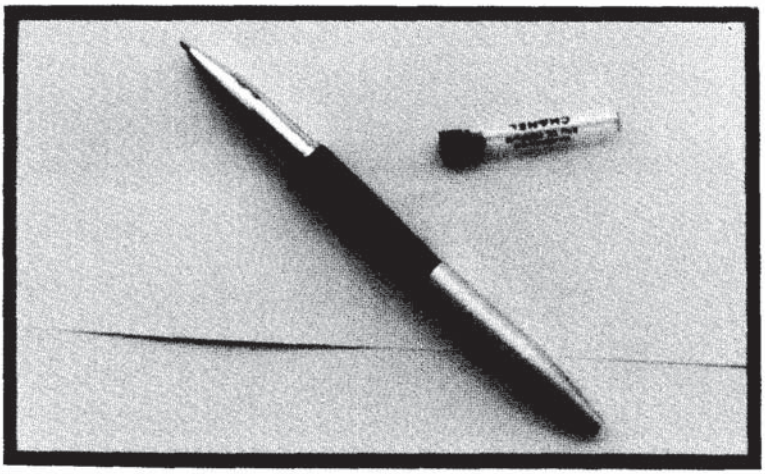


Figure 9

PEN GUN

Among other weapons, Federal law prohibits possession of pen guns. However, a magical supply house sells a shooting wand. The wand is 15 inches long and 1/2 inch in diameter. The wand tips are made of polished brass and are 2 1/2 inches long. The shooting device is just like a gun and has a steel barrel. The wand requires no gun license, since it will shoot only blank cartridges. But it can be converted into an illegal pen gun that will fire regular .22 caliber bullets.

POCKET PEN RADIO

This is a radio hidden in a pen barrel. It can be used to listen in on conversations picked up by secret wireless microphones. It comes with a tiny earphone for listening while writing. See Figure 10.

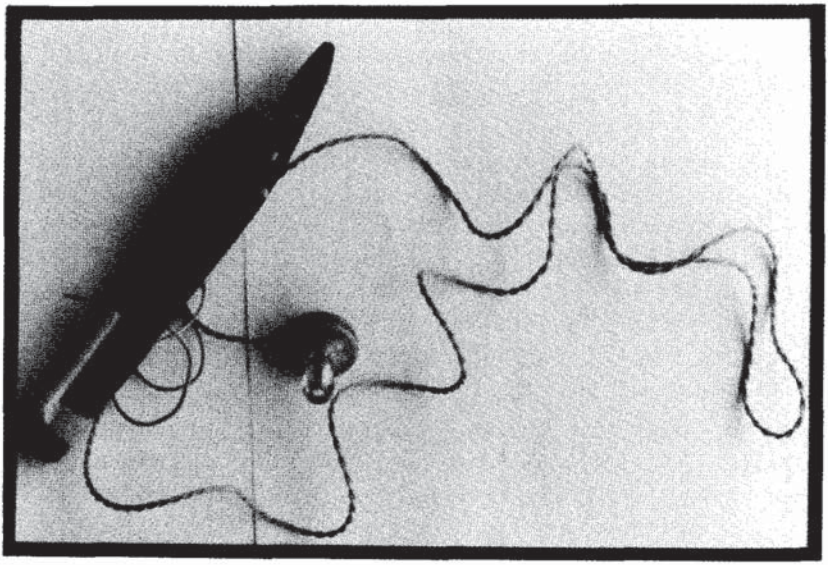


Figure 10

SUBMINIATURE CAMERA PEN

This is a camera disguised as a pen for use on surveillance missions. The film compartment is opened, the film cassette of 6 exposures is inserted and the film compartment closed again. A counter indicates the exposure number. When an exposure has been made by depressing the shutter release, the film wind-on lever is operated to prepare for the next exposure. Little noise is generated in making an exposure, since these pen cameras have been specifically designed for special missions.

EAVESDROPPING MICROPHONE PENS

There are three different types of microphone pens.

The first of these is the wireless inductive microphone pen. This is a ballpoint pen with a built-in microphone and inductive transmitter. Also needed is a micro tape recorder with an inductive receiver. It is possible to wear the combination (pen, receiver and recorder) anywhere in one's clothing. The receiver and recorder, worn in different parts of one's clothing, will record conversations inconspicuously. No wires are required.

A second type of microphone pen is the wired fountain pen microphone and recorder. This is a disguised microphone designed to meet surveillance requirements for espionage and police work. The microphone stares the target right in the face, but they see only a fountain pen. Of course, it's a dummy case containing an ultra-sensitive microphone. A micro cassette recorder hidden in the clothing tapes the conversation noiselessly. See Figures 11 and 12.

The third type of microphone pen is the FM transmitter pen. This disguised pen transmitter is an excellent eavesdropping device. Powered by 23-volt, lithium batteries, the pen can be heard 1,000 feet away on a standard FM radio. This pen microphone is considerably more sensitive than the human ear. The ball point can write while one eavesdrops. See Figure 13.

Figure 11

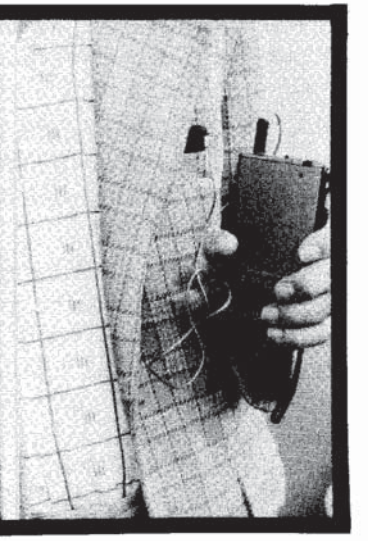


Figure 12

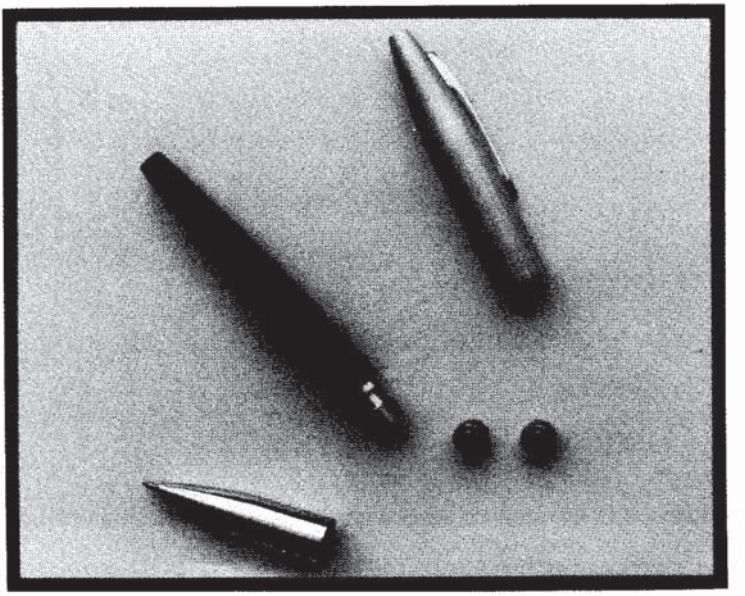


Figure 13

SLOT MACHINE DRILL PEN AND CENTER PUNCH PEN

A drill and a center punch, both disguised as pens, are used to fool the "Eye in the Sky" observation posts in gambling casinos while cheating slot machines. Usually two cheaters work together at this.

Playing the slot machine, the first cheater uses a four-inch ruler to mark the strategic place to be drilled, 4 inches up from the bottom and 4 inches in from the back, where the levers that control the machine are. He hits the measured spot with the center punch pen, which has a hardened, heat-treated, steel point for strength. This indicates where the other cheater should drill, and helps the drill to start cutting without wandering about the surface.

The other cheater then plays the machine and secretly uses the drill to pierce a tiny hole in the marked spot. The drill pen is a spiral-rachet, quick-return drill, which provides

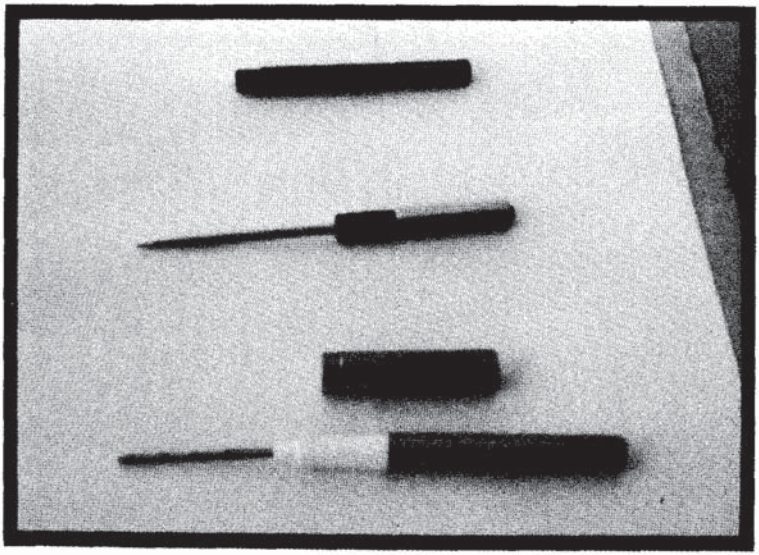


Figure 14

the fastest and easiest way to drill a hole in a slot machine by hand. (Some casinos, however, have expensive slot machines lined with a steel sheet which the drill pen cannot pierce.) The cheater simply pushes down on the spring-loaded shaft to turn the bit, which is made from high-grade, vanadium-alloy steel, heat-hardened for extra strength. After drilling the hole, he rubs this spot with soap to conceal it and leaves.

The first cheater cuts a 12-inch length of wire from a coat hanger. Bending 4 inches from one end, he bends the wire into an L-shaped form. He takes the wire to the set-up machine and slips the 4-inch-long section into the hole. After dropping a coin in the slot, he simultaneously pulls the handle with one hand and the hanger wire with the other. He receives a pay-off after each play, and sometimes a jackpot, no matter what symbols appear. See Figure 14.

LOCK PICKING PEN

All types of locks can be picked with the lock picking pen set. It looks like a regular pen, but by taking it apart and reassembling it, it becomes an effective pick set. The professional thief may carry a lock picking pen to get around state or local laws prohibiting possession of lock picks except by licensed locksmiths. See Figure 15.

Some of the unusual covert pens described in this chapter may be purchased from PK Electronics, the world's largest manufacturer of sophisticated electronics equipment for government use. They also welcome business from the general public. Their address is:

PK ELECTRONIC
PRODUKTIONSGESELLSCHAFT MBH & CO.
KG HEIDENKAMPSWEG 74
2000 HAMBURG 1
FEDERAL REPUBLIC OF GERMANY

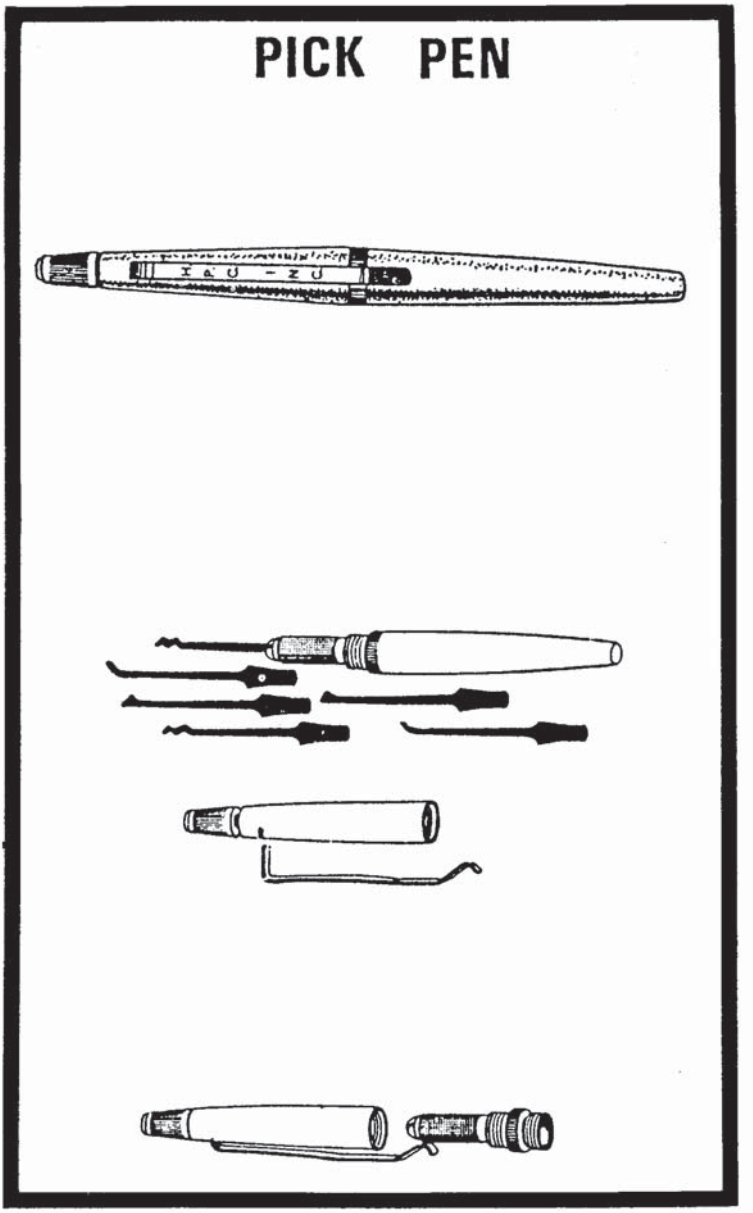


Figure 15

COVERT MAIL OPENING

This chapter is not designed to make the reader a competent surreptitious mail opener. Mail opening and reading sealed letters is a very specialized field and to treat it properly would require an entire book, at least. However, this chapter will acquaint the reader with a few basic mail-opening techniques which have proven to be effective.

SOVIET PENCIL MAIL-OPENING METHOD

This method consists of rolling the flap open. A blunt instrument, such as a lead pencil, is inserted in the opening which almost always exists at either extremity of the flap, where the paste layer ends. This opening is a weak spot in the envelope, and it is the starting point for removing the contents. The lead pencil is carefully and slowly rolled along the edge of the flap, which, in most cases, will easily open. Sometimes it is better to start on the under flap because this generally has inferior glue and loosens more readily. In this case, open only one part of the bottom flap and the opposite of the upper flap.

When this method of opening letters has been used, it can be detected in the following way. Fibers from the paper will be detached from the upper as well as the under surface of

the layer of glue. Often thin lamina will be detached from the paper. There is no way whatsoever to hide these marks. To reseal the envelope, a different glue than the one originally present on the envelope must be used. This produces a double glue line when the flap is pressed against the envelope for a second time. It is almost impossible to match the former edge of the glue line with the new one. This can be seen with a magnifying glass or microscope.

SOVIET KNITTING NEEDLES MAIL-OPENING METHOD

As already mentioned, there is almost always an opening at either extremity of the flap, where the paste layer ends. Through this opening the contents of the envelope may be removed without unsealing it. For this purpose, two knitting needles fastened together by means of a cork can be used. Or a special instrument consisting of a small steel rod may be used. The letter, if it is sufficiently thin, is grasped and rolled on the needles or rod and drawn out through the opening. The letter can then be read, rolled back on the object used, inserted in the opening and put back in place.

To detect this method of letter-opening, study the envelope while illuminated from the back with a strong light. Places where the fiber or thin particles of paper have detached will show up brighter than the rest of the glued border. Such places are encircled with a fine lead pencil and examined closely. Two incisions running through the edge of the flap are made with a sharp knife so that only the part of the flap between the two cuts can be lifted. A piece of filter paper soaked with water is put on the suspected spot. When the glue has been dissolved, the small flap is lifed with the aid of forceps. Great care must be taken in lifting this flap so as not to cause new fibers to become detached. Now a magnifying glass is used to examine the under surface of the flap and of the envelope. Detached paper fibers or thin particles can be easily seen and are a sure sign of previous opening.

Although this examination is a simple one, a very experienced eye is necessary. Soviet mail openers proceed with the utmost care and leave very few traces of their work. But careful examination should nevertheless lead to detection in most cases. The fingerprints of the opener should be looked for. Furthermore, the knitting needle method of mail opening will surely leave marks on the letter.

SOVIET TRANSILLUMINATION METHOD

In this method, letters are illuminated by a strong light coming from the back in the hope of reading through the translucent paper. However, this will not be possible if the paper and envelope are thick. To make a print of the contents, put the letter on a plate, in a frame with sensitive bromide paper behind it, and use powerful light for some time. The contents will appear on the print — white on a black background. Deciphering the contents will be difficult, however, if the letter is folded and closely written. The same difficulty may be encountered when using X-rays to make a print. In this method, a plate is placed in the frame and the letter is illuminated with very soft X-rays for a short time.

These methods will not leave any markings whereby detection is possible. Thus, whoever wishes to protect his mail against such methods should use thick envelopes and thick paper. In order to make it impossible to read letters by X-rays, envelopes have been put on the market with linings containing lead.

SOVIET STEAM METHOD

This method consists of letting the vapor from boiling water act on the sealed back of the envelope, dissolving the glue so that the envelope can be opened.

This method inevitably leaves traces on the paper in the form of waves, facilitating detection. Stamps and marks of

indelible ink or pencil writing will also be dissolved to some extent, leaving blurs.

When the adhesive on an envelope does not seal tightly, use colorless nail polish as a glue. It dries almost instantly and leaves no smudge. A letter sealed in this manner cannot be steamed open.

SOVIET BLOTTING PAPER METHOD

A better method than using steam consists of passing thin blotting paper soaked in water over the sealed edge of the flap. This method injures only a small part of the flap. However, if a glue other than the original is used, this will show up under ultraviolet light.

SOVIET ETHER METHOD

This method is very simple. Just rub ether over the envelope, thereby making it transparent. The written or typed message immediately becomes visible through the envelope. The ether evaporates quickly, leaving no trace.

SEALED ENVELOPES SECRET INK

This secret ink can be used to detect surreptitious opening of letters by means of water or steam. It consists of 1 part by weight of uranium acetate, 1 part of ferrocyanide of potassium, three parts of white lead (lead carbonate) or white zinc (zinc oxide) or a mixture of both, plus a sufficient quantity of lithographic varnish and turpentine to produce an ink of the desired consistency. To protect the gum flap of an envelope from being opened with steam or water, use this secret ink to mark the flap of the envelope. If water or steam is applied, this pale white or yellow-tinted secret ink changes to a permanent dark brown.

SOVIET METHODS OF REMOVING WAX SEALS

One method consists of lifting the whole seal either by pulling it away directly or by inserting a thin, electrically-heated platinum wire. This method is most likely to work if the seal is thick. The seal is replaced either by pasting it back on or by heating its undersurface and roughing the paper to bring about better adhesion.

Another method is to place a piece of soft lead plate over the seal and to strike it with a strong and absolutely vertical blow with a wooden club. The seal breaks in pieces, but a faithful reproduction of it on the lead plate results. This is then used to make new seals.

The most commonly used method consists of building a wall of plastelina around the seal and pouring a plaster of Paris mixture on it. When this has dried, the plaster cast reproduces the original seal quite faithfully. Sealing wax of the same color as the original is used to make the new seals. Clever Soviet openers are able to make a plaster cast of the seal, open a letter, remove the contents, close it and put on a new seal in about twenty minutes. Seals made with the plaster cast have some drawbacks, however. While reproducing all the faults in the original seal, the outlines of letters are never as sharp and clearcut as when made with the metal signet. Furthermore, minute traces of plaster lodged in the false seal may be detected by enlargement. Therefore, it should almost always be possible to detect this type of tampering, although an experienced eye is always needed. To overcome the drawbacks of the plaster cast, some openers have used certain dental compositions, such as copper amalgam.

In seeking to detect the removal of waxed seals, examine the wax of the seals on a number of letters to see if any of them differs from the others. Examination under ultraviolet rays may be useful, since sealing waxes which look alike may have different florescences. However, slight differences in the luminescence do not always mean that the seals have

been made with different waxes, since the method of melting or burning the sealing wax will produce different florescences in different pieces from the same stick of sealing wax. To determine the range of such differences, experiments must be carried out with the same sealing wax. A chemical or microchemical analysis of the sealing wax may also be useful in detecting a difference between the wax of an opened seal and that of other seals. If a seal has broken in the process of lifting it away from the letter, the opener will have to repair it by piecing it in place. In such a case, the different sealing waxes used can be easily detected using ultraviolet light.

EMPTY ENVELOPE WRITING DEVELOPER

Writing which has had contact with paper for at least a few hours leaves invisible traces. The inside of an envelope containing a letter may have such invisible traces of writing which can be developed in a dark room with a red light using a solution of 5 grams of silver nitrate, 1 gram of citric acid, .5 gram of tartaric acid, and three drops of nitric acid in 100 grams of distilled water. The writing is fixed with ordinary fixing solution. The writing should be photographed before fixing, since the letters may fade.

SOVIET METHOD OF RESTORING FADED WRITING

Writing rendered illegible by aging may be restored by moistening it, using a feather, with an infusion of gall nuts (tannic acid) or a solution of prusside of potash slightly acidulated with muriatic acid. Be careful to apply the liquid so that the ink does not spread.

SOVIET METHOD OF READING SECOND SHEET

A message written on a pad of writing paper and removed can be developed on the sheet underneath. This second sheet is placed in a solution of florescin salts and photographed under an ultraviolet light.

CHEMICAL AND PHYSICAL DATA

This is a reference list for all requiring ready access to chemical and physical data used in secret ink work and manufacturing.

The chemicals listed here represent those used in secret ink formulas and also in less known procedures. The chemicals are listed alphabetically under the names accepted as standard in the modern chemical industry, with the synonyms under which they are known colloquially. Solubilities have been indicated throughout approximately as: very soluble (1 part solvent required to dissolve one part of solid), freely soluble (1 to 10 parts of solvent required to dissolve one part of solid), soluble, over 90% of the solid is soluble (10 to 30 parts of solvent required to dissolve one part of solid), sparingly soluble (30 to 100 parts of the solvent required to dissolve one part of the solid), partly soluble (41% to 90%), slightly soluble (100 to 1000 parts of solvent is required to dissolve one part of the solid), very slightly soluble (1,000 to 10,000 parts of solvent is required to dissolve one part of the solid).

Every chemical is unique in its chemical and physical properties. Therefore no chemical can replace another equally in all its characteristics. The following list which should be scrutinized gives most of the factors which must be

considered in searching for a suitable chemical or formula. Only those properties which are absolutely essential for secret ink work are listed.

GRADE OR PURITY OF CHEMICALS

In practically every phase of secret ink work the cost of chemicals represents only a small fraction of the total cost involved. For this reason, the extra cost of high quality chemicals should be considered a worthwhile safeguard, as the extra expense is almost negligible.

A.R. Analytical Reagent. Chemicals of A.R. quality are used primarily for analytical secret ink purposes. Such chemicals stand at the top in purity. They are used for secret ink purposes in special cases.

B.P. This refers to the *British Pharmacopoeia*, an official British compendium giving the requirements for purity for many drugs and chemicals. A drug or chemical marked B.P. indicates that it meets all the specifications of the British Pharmacopoeia.

C.P. Stands for *Chemically Pure.* Each container usually bears a label of analysis, indicating the amounts of impurities present. This grade is usually the purest grade of chemical available. It is generally more expensive than the other grades but it is not specified except when high purity is required. The term C.P. has been largely replaced by the designation A.R. A few of the chemicals are still sold under this designation because the trade practice has become so firmly established. For example: Silver Nitrate C.P. Crystals.

Commercial. This is the most common grade of chemical sold. Any chemical which does not bear a grade designation can be considered of commercial grade. This grade should not be used for secret ink purposes without investigation.

N.F. This shows that the product is listed in the *National Formulary* and is recognized by the American Pharmaceutical Association. N.F. meets the requirements of

the National Formulary, the edition of which is indicated by the respective Roman numeral.

N.N.R. This shows that the product is listed in *New and Non-Official Remedies* and is recognized by the American Medical Association.

Special. This refers to a particular grade made for a particular consumer or industry. It is different, in degree, from all other grades... either more or less pure. Its form and packaging may also be different.

U.S.P. This refers to the *United States Pharmacopoeia,* an official compendium giving the requirements for purity for many drugs and chemicals. A drug or chemical marked U.S.P. indicates that it meets all the specifications of the United States Pharmacopoeia. Chemicals of U.S.P. quality are satisfactory for secret ink work because of their uniformity, high purity, and availability. For example: Potassium iodide U.S.P.

Unofficial. This indicates that the drug or chemical has not been tested by the proper authorities and that it is not yet officially recognized in the pharmacopoeia.

DIRECTIONS FOR COMPOUNDING INGREDIENTS IN SECRET INK FORMULAS

Formulas are sometimes indicated not in units of weight or volume, but in "parts." In the case of liquids, parts should be taken as meaning units of volume and in the case of solids as units of weight. A "part" may, therefore, mean anything from a grain to a ton, or a minum to a gallon as long as the other quantities are reckoned in the same units of weight or volume.

In cases where both liquids and solids are indicated in "parts," it should be remembered that equivalent units of

weight and volume must be employed. Thus ounces for solids will have to go with fluid ounces for liquids. Grams for solids, with cubic centimeters for liquids.

When small quantities of chemicals are called for in solutions, smaller than is practical to weigh out on ordinary scales (under 10 grains or 0.7 grams) with a reasonable degree of accuracy, they are usually expressed in terms of percentage solutions, such as 2½%, 5%, or 10%. Chemicals most frequently referred to in percentage solutions are potassium bromide, acetic acid, sulfuric acid and hydrochloric acid.

CHEMICALS

ACACIA: See gum Arabic.

ACETA: See vinegar.

ACETIC ACID: CH_3COOH; the acid contained in vinegar (3 to 6%); a colorless, corrosive liquid with a pungent smell; at low temperature it solidifies to glacial acetic acid. Uses: Bright Blue Secret Laundry Ink, Secret Fire Ink.

ACETONE: CH_3COCH_3; colorless liquid; highly volatile and inflammable. Mixes in all proportions with water, alcohol, ether. Uses: Gestapo Blood-Red Secret Ink, Israeli Special Process Secret Ink.

ACETYLSALICYLIC ACID: See aspirin.

ALBUMEN: The white or clear viscous part of an egg. Use: Secret Fire Ink.

ALCOHOL: Alcohol is an organic compound containing one or more hydroxyl (OH) groups. As used in the U.S. Pharmacopoeia, alcohol contains 91% by weight of ethyl alcohol and 9% of water; diluted alcohol (proof spirit) contains 45.5% by weight of ethyl alcohol, 54.5% of water. Uses: Chinese Red Invisible Ink, Light Red Secret Ink, Secret Pass-Out Ink, Secret Water Ink, Vanishing Ink No. 10.

ALUM: See ammonium alum, potassium alum.

ALUMINA HYDRATE: See aluminum oxide.

ALUMINITE: See potassium alum.

ALUMINUM ACETATE, BASIC: $Al(C_2H_3O_2)$; white powder, soluble in cold water. Use: Secret Furniture Ink.

ALUMINUM SULFATE: See potassium alum.

ALUMINUM CHLORIDE: $AlCl_3.6H_2O$; Hexagonal, white colorless crystals; hydrochloric acid odor; very deliquescent. Solution: dissolve 22 grams of aluminum chloride in 1 liter of water. Use: Mossad Secret Ink Developer.

ALUMINUM OXIDE: Al_2O_3; white monoclinic crystals. Insoluble in water, very slightly soluble in acid. Uses: Blue Printing Press Invisible Ink, P.L.O. Red Secret Printing Ink.

ALUMINUM POWDER: See aluminum acetate, basic.

AMMONIA: See ammonium hydroxide.

AMMONIA WATER: See ammonium hydroxide.

AMMONIUM ALUM: $Al_2(NH_4)_2(SO_4)_4.24H_2O$. Colorless crystals or white powder; styptic taste. Freely soluble in water, glycerin; insoluble in alcohol. Uses: Indelible Invisible Ink, Iodine Vapor Secret Ink Developer, Secret Egg Ink.

AMMONIUM CHLORIDE: NH_4Cl; white odorless granules or powder. Freely soluble in water and ammonium hydroxide; soluble in alcohol. Solution: 161 grams per liter of water. Uses: Black Vanishing Ink, Brown Invisible Ink, Dark Brown Vanishing Ink, Dark Brown Secret Vapor Ink, PLO Secret Vapor Ink, Yellow Invisible Ink.

AMMONIUM HYDROXIDE: NH_4OH; colorless liquid; intense, pungent, suffocating odor; strong alkaline reaction; miscible in all proportions of water and alcohol. Uses: Austrian Black Secret Ink, Double Agent Red Secret Ink, Gestapo Blood Red Secret Ink, Iodine Vapor Secret Ink Developer, Israeli Pale Blue Ink Nos. 1 and 2, Light Blue Secret Ink, Navy Blue Secret Ink, Red Vanishing Ink, Secret

Fiery Ink Bottle, Secret Ink Magic, Secret Water Ink, Turkish (MIT) Black Secret Ink, Underground Blue Secret Ink.

AMMONIUM SULFATE: $(NH_4)_2SO_4$; the salt existing as a water-soluble crystalline solid. Source: Fertilizer. Use: Fireproof Paper.

AMMONIUM SULPHATE: See ammonium sulfate.

AMYLUM: See starch.

ANTHRACENE: A coal-tar derivative which can also be synthesized from phtalic anhydride and benzene with a Friedel-Crafts catalyst. Uses: Invisible Typing Carbon Paper, Soviet Cipher Brilliant Blue Secret Ink, Soviet Defector's Secret Fire and Ink Shield.

AQUA AMMONIA: See ammonium hydroxide.

ARROWROOT: A nutritive starch obtained from the rootstocks of Maranta Arunacea. Use: Vanishing Ink No. 9.

ARSENIC TRIOXIDE: As_2O_3. Use: Australian Secret Vapor Ink.

ARTICHOKE JUICE: A composite plant somewhat resembling a thistle. Juice is extracted from the thick and fleshy flower head. Use: Brown Invisible Ink.

ASPIRIN: $C_6H_4(COOH)CO_2CH_3$; a white crystalline derivative of salicylic acid. Use: Prison Blue Secret Ink.

AURIC CHLORIDE: $AuCl_3.HCl.3H_2O$; a bright golden-yellow crystalline compound; quite hygroscopic; soluble in water and alcohol. Contains approximately 50% gold. Use: Secret Mercurial Ink.

BARIUM CHLORIDE: $BaCl_2.2H_2O$; monoclinic crystalline form, colorless. Soluble in cold and hot water; slightly soluble in hydrochloric acid, nitric acid; insoluble in alcohol. Solution: 61 grams per liter of water. Use: White Secret Ink.

BARIUM SULFHYDRATE: $Ba(SH)_2 4H_2O$; white rhombic crystals; soluble in hot or cold water. Use: Bright Green Secret Ink.

BASIC LEAD CARBONATE: See lead carbonate, basic.

BATTERY ACID: See sulfuric acid.

BENZINE: A colorless flammable liquid derived from crude petroleum and consisting of various hydrocarbons. Use: Soviet Cipher Brilliant Secret Ink.

BETA-METHYL UMBELLIFERONE: Secret Pass-Out Ink.

BETA-NAPTHOL: $C_{10}H_7OH$; white or colorless leaflets or powder. Soluble in alcohol, ehter, chloroform, benzene, oils, alkaline solutions. Use: Bright Blue Secret Laundry Marking Ink.

BETAMONOHYDROXY-NAPTHALINE: See beta-napthol

BISMARCK BROWN Y BASE DYE: A commonly used fabric dye. Use: Secret Red Blockout Ink.

BISMUTH CITRATE: $BiC_6H_5O_7$; crystals. Soluble in ammonium hydroxide; insoluble in alcohol. Uses: Dark Brown Vanishing Ink, Dark Brown Secret Vapor Ink, PLO Secret Vapor Ink.

BISMUTH NITRATE: $Bi(NO_3)_3.5H_2O$; triclinic colorless crystalline form; slightly hygroscopic. Decomposes in hot or cold water. Very soluble in nitric acid; soluble in acid. Solution: 40 grams of bismuth nitrate in 1 liter of dilute nitric acid (use 1 part of nitric acid to 5 parts of water). Use: Secret Water Ink.

BISULPHATE OF POTASH: See potassium bisulfate.

BLUE STONE: See copper sulfate.

BLUE VITRIOL: See copper sulfate.

BORACIC ACID: See boric acid.

BORAX: See sodium tetraborate.

BORIC ACID: H_3BO_3; white triclinic soluble crystals. An acid derived from boron trioxide. Use: Fireproof Paper.

BRANDY: A strong alcoholic liquor distilled from wine. Use: Black Vanishing Ink.

BUTTERMILK: The more or less acidulous liquid remaining after butter has been churned from milk. Use: Brown Invisible Ink.

CABBAGE JUICE: The common cabbage has a compact head of leaves. Cauliflower, Brussels sprouts, etc. are sometimes classed as cabbages. The juice is extracted. Use: Brown Invisible Ink.

CALCIUM CHLORIDE: $CaCl_2.6H_2O$; a white absorbent, lumpy or crystalline salt; soluble in water. Use: Secret Water Printing Ink.

CAMPHOR: $C_{10}H_{16}O_7$; a whitish, translucent, volatile and aromatic crystalline substance (tough resin or gum). Use: Secret Water Ink.

CAOUTCHOUC: A South American word. Rubber, natural rubber, sometimes called India rubber; gum elastic. Use: British Black and Blue Secret Ink.

CARBOLIC ACID: See phenol.

CARBON PAPER: Paper faced with a preparation of carbon or other material. Use: Secret Monte Tell or Chink Ink.

CARBON TETRACHLORIDE: CCl_4; a heavy colorless nonflammable liquid which is poisonous and gives off heavy vapors. It is prepared by the reaction between chloride and carbon disulfide. Use: Chinese Red Invisible Ink.

CARBONATE OF LEAD: See lead carbonate.

CARBONATE OF SODA: See sodium carbonate.

CAUSTIC POTASH: See potassium hydroxide.

CAUSTIC SODA: See sodium hydroxide.

"CELLOSOLVE" ACETATE: $CH_3COOCH_2CH_2OC_2H_5$; an industrial organic compound. Chemical name: Ethylene glycol monoethyl ether acetate. Water white colorless liquid; pleasant odor. Use: Secret Water Ink.

CELLULOSE NITRATE: See pyroxylin.

CERUSE: White lead, composed of hydroxide and carbonate of lead. Use: Secret Artificial Water Mark.

CHINA CLAY: There are many varieties of this material obtained from the decomposition of granite, but that which is of most interest is a colloidal form prepared by electrical precipitation and giving a very fine suspension in water. Kaolin; a relatively pure hydrated aluminum silicate $Al_2O_3.2SiO.2H_2O$. Use: Perpetual Writing Pad.

CHINA WOOD OIL: See tung oil.

CHLORATE OF POTASH: See potassium chlorate.

CHLORIDE OF COBALT: See cobaltous chloride.

CHLORIDE OF MERCURY: See mercuric chloride.

CHLORIDE OF NICKEL: See nickel chloride.

CHLORIDE OF PALLADIUM: See palladium chloride.

CINCHONINE: $C_{19}H_{22}N_2O$; colorless needles, colorless monoclinic crystals. An alkaloid from the bark of several species of cinchona along with quinine. Use: Secret Furniture Ink.

CINNAMIC ALDEHYDE: $C_6H_5CH{:}CH.CH{:}O$; very slightly soluble in water; 50% soluble in alcohol; soluble in all proportions in ether. Uses: Hustler's Luminous Secret Ink, Secret Luminous Lover's Ink.

CITRIC ACID: $C_3H_4(OH)(COOH)_3$; colorless rhombic crystals. Soluble tribasic organic acid. Occurs free in citrus fruits. Use: Empty Envelope Writing Developer.

COBALT ACETATE: See cobaltous acetate.

COBALT CHLORIDE: See colbatous chloride.

COBALT SALTS: Co; silver-white magnetic element that is tough, lustrous and ductile. Use: Temperature-Sensitive Invisible Ink.

COBALTOUS ACETATE: $Co(CH_3CO_2)_2$; red-violet color and monoclinic crystalline form. Soluble in cold and hot water; soluble in acid. Use: Blue-Green Ink.

COBALTOUS CHLORIDE: $CoCl_2.6H_2O$; monoclinic crystalline form and red color. Solution: 26 grams per liter of water. Uses: Blue-Green Invisible Ink, Blue Printing Press Invisible Ink, Bright Green Secret Ink, Green Invisible Ink, Secret Water Ink, Sucker Bet Secret Ink.

COBALTOUS NITRATE: $Co(NO_3).6H_2O$; monoclinic crystalline form and red color. Soluble in hot and cold water, alcohol, acetone. Uses: Dark Green Secret Ink, Navy Blue Secret Reagent Ink, Red Invisible Lover's Ink, Red-Brown Secret Ink, Underground Blue Secret Ink.

COBALTOUS OXIDE: CoO; cubic crystalline form and brown color. Insoluble (40% or less of the solid will dissolve) in cold water, hot water, alcohol; soluble in (over 90% of the solid will dissolve) ammonium hydroxide. Use: Secret Postal Card Ink.

COLOPHONY: See rosin.

COLLODION: A solution of pyroxylin (soluble gun cotton) in ether containing a varying proportion of alcohol. Use: Israeli Special Process Secret Ink.

COLLODIUM: See collodion.

COMMERCIAL NITRIC ACID: A water solution containing 68% of pure acid. It is often colored yellowish-brown because of dissolved nitrogen peroxide. See nitric acid.

COMMON ALUM: See potassium alum.

COMMON SALT: See sodium chloride.

COPPERAS: See ferrous sulfate.

COPPER BROMIDE: See cupric bromide.

COPPER CHLORIDE: See cupric chloride.

COPPER POWDER: See cupric chloride.

COPPER SALTS: Copper forms two series of salts: cuprous and curpic. Use: Temperature-Sensitive Invisible Ink.

COPPER SULFATE: $CuSo_4.5H_2O$; blue crystals, slowly efflorescing in air; almost white when dehydrated. Freely

soluble in water; insoluble in alcohol. Solution: Dissolve 124.8 grams in distilled water to which 5 milliliters of sulfuric acid has been added. Dilute to one liter with water. Source: Found in swimming pool water treatment kits and germicides. Uses: Black Vanishing Ink, Brown Invisible Ink, Brown Secret Ink, Golden-Yellow Secret Ink, Green Secret Ink, Israeli Pale Blue Secret Inks, Light Blue Secret Ink, Secret Water Ink for Bar Bets, Yellow Invisible Ink.

CORROSIVE SUBLIMATE: See mercuric chloride.

COTTONSEED OIL: The seed of the cotton plant which is used as a substitute for olive oil. Use: Luminescent Secret Ink.

CRUDE POTASSIUM CARBONATE: See potassium carbonate.

CUBE ALUM: See potassium alum.

CUPRIC BROMIDE: $CuBr_2$; monoclinic crystalline form and black color. Very soluble in cold water; soluble in ammonia, alcohol, acetone; insoluble in benzene. Use: Blue-Green Invisible Ink.

CUPRIC CHLORIDE: $CuCl_2$; rhombic crystalline form of green color. Soluble in water, alcohol, ether and ammonium chloride. Solution: 43 grams per liter of water. Use: Bright Green Secret Ink, Secret Furniture Ink.

CUPRIC SULFATE: See copper sulfate.

CUPROUS IODIDE: Cu_2I_2; white cubic crystals. Nearly insoluble in alcohol or water. Use: Secret Ink for Temperature-Sensitive Paper.

DENATURED ALCOHOL: See methyl alcohol.

DEXTRIN (DEXTRINE): $(C_6H_{10}O_5)x$; colorless amorphous crystals. Soluble in water; insoluble in alcohol, ether. A group of water-soluble gummy substances formed from starch by the action of heat or weak acids. Uses: Blue Printing Press Invisible Ink, PLO Red Secret Printing Ink, Vanishing Ink No. 10.

DEXTROSE (GRAPE SUGAR): $C_6H_{12}O_6$; the sugar found in many plants; corn sugar. Use: Secret Fiery Ink Bottle.

DIETHYL ETHER: $(C_2H_5)_2O$; colorless liquid or rhombic crystals. Soluble in water; miscible in alcohol, ether, chloroform, benzine; soluble in concentrated sulfuric acid. Fumes are explosive in the presence of oxygen. Use: Soviet Mail-Reading Method, Vanishing Ink No. 10.

EGG WHITE: See albumen.

ESCULETIN: $(HO)_2C_6OCoCh{:}Ch$; needles. Slightly soluble in cold water; soluble in alcohol; very slightly soluble in ether; soluble in diluted alkalis. Use: Yorkville Deep Violet Secret Ink.

ETHER: See diethyl ether.

ETHYL ALCOHOL (ETHANOL): C_2H_5OH; transparent, colorless, mobile and volatile liquid with a slight characteristic odor. It is inflammable. Miscible in all proportions with water, ether, and chloroform. 40% alcohol is the equivalent of 40% by volume or 80 proof alcohol. Use: Yellow Pass-Out Ink.

FERRIC AMMONIUM: See iron ammonium alum.

FERRIC AMMONIUM SULPHATE: See iron ammonium alum.

FERRIC CHLORIDE: $FECl_3.6H_2O$: orange-yellow opaque masses or lumps, deliquescent; occurs also as brown scales, but green scales are preferred for secret purposes. Both salts are light-sensitive, soluble in water, alcohol, ether. Solution: 27 grams per liter of water. Use: Double Agent Secret Ink, Hitler's Secret Crimson Anatomy Ink, Red Secret Ink, Secret Ink Magic, Violet Secret Ink.

FERRIC SULFATE: $Fe_2(SO_4)_3$; prepared by oxidizing ferrous sulfate in the presence of sulfuric acid. Uncrystallized form. Slightly soluble in cold water. Use: Invisible Ink Patent No. 1,423,246 (1922), Secret Water Ink.

FERROCYANIDE OF POTASSIUM: See potassium ferrocyanide.

FERROUS SULFATE: $FeSO_4.7H_2O$; monoclinic blue-greenish crystals, often rusty in color or white from efflorescence. Rinse off rusty powder. Uses: Blue Secret Reagent Ink, Coal Black Secret Reagent Ink, French Cloak and Dagger Ink, Invisible Ink Patent No. 1,423,246 (1922), Past Posting Secret Ink, Secret Black Anatomy Ink, Turkish (MIT) Black Secret Ink.

FERROUS SULFIDE: FeS; soluble in acid; insoluble in ammonia. Use: Secret Buddha Ink.

FLORESCIN SALTS: Also known as resorcinolphthalein. Use: Soviet Method of Reading Second Sheet.

FORMALIN: See formaldehyde.

FORMALDEHYDE: HCHO; a clear, colorless, volatile liquid resembling acetic or ethyl aldehyde and chemically intermediate between methyl alcohol and formic acid. Use: High Temperature Brown Invisible Ink, Waterproof Paper.

FRUIT JUICE: Use: Temperature-Sensitive Invisible Ink.

FUMING SULPHURIC ACID: See sulfuric acid.

GALLIC ACID: $C_6H_2(OH)_3CO_2H$; colorless monoclinic needles from water. A colorless or slightly yellow crystalline acid. Use: Coal Black Secret Reagent Ink, Iodine Vapor Secret Ink Developer.

GALLS OR GALLNUTS: The galls or gallnuts of commerce are produced by insects of the genus Cynips, chiefly on an oak. They contain much tannin, and are used in the manufacture of that article and for making ink and a black dye. Uses: French Cloak and Dagger Black Secret Ink, Soviet Method of Restoring Faded Writing.

GARLIC JUICE: A plant of the genus Allim (Allium sativum is the cultivated variety), having a bulbous root, a very strong smell, and an acrid, pungent taste. Use: Indelible Invisible Ink.

GASOLINE: A volatile flammable liquid consisting of a mixture of hydrocarbons. Use: Secret "Violent Fiery" Ink Bottle.

GELATIN (GELATINE): Animal jelly; glutinous material obtained from animal tissues by prolonged boiling. Use: Waterproof Paper.

GLUE (ANIMAL): A hard, brittle, brownish gelatin, obtained by boiling to a jelly, the skins, hooves, etc. of animals. Use: Waterproof Paper.

GLYCERIN (GLYCEROL): $CH_2OH.CHOH.CH_2OH$; clear colorless syrupy liquid, hygroscopic, miscible with water, alcohol, insoluble in ether, chloroform. Uses: Chinese Red Invisible Ink, Mossad Secret Ink Developer, PLO Red Secret Printing Ink, Secret Pass-Out Ink, Secret Red Blockout Ink, Secret Water Ink.

GOLD CHLORIDE: See auric chloride.

GRAPHITE: Graphite is a soft, black solid made up of minute crystals or scales that slide over each other very smoothly. It is virtually infusible, readily conducts electric current, and is insoluble in all common liquids. "Lead" pencils are one source of graphite. Uses: British Black and Blue Secret Ink, Secret Monte Tell or Chink Ink, Yorkville Deep Violet Secret Ink.

GRAPEFRUIT JUICE: An edible, large, round, pale yellow fruit with an acid flavorful pulp from which the juice is extracted. Use: Brown Invisible Ink.

GREEN COPPERAS: See ferrous sulfate.

GREEN VITRIOL: See ferrous sulfate.

GUM: A vegetable secretion of many trees or plants that hardens when it exudes, but is soluble in water; as, gum arabic; gum tragacanth; the gum of the cherry tree. Uses: Black Vanishing Ink, Coal Black Secret Reagent Ink, Dark Brown Vanishing Ink, Fireproof Ink, Glazed Paper Vanishing Ink, Israeli Pale Blue Secret Ink, PLO Secret Vapor Ink, Secret Fiery Ink Bottle, Secret Ink for Cheating Bookmakers, Secret Postal Card Ink, Secret Pyrotechnic Stage Ink.

GUM ARABIC: See gum.

GUM BASSORA: See gum arabic.

GUM CAMPHOR: See camphor.

GUM MASTIC: A resin exuding from the mastic tree and obtained by incision. Use: Secret Blue Blockout Ink, Secret Red Blockout Ink.

GUM SANDARAC: A white or yellow resin obtained from a Barbary tree and pulverized for pounce. Soluble (over 90% of the resin is soluble) in ethyl alcohol, ether, amyl alcohol, aniline and amyl acetate. Uses: Secret Blue Blockout Ink, Secret Blockout Blender, Secret Red Blockout Ink.

GUM TRAGACANTH: A kind of gum procured from a spiny leguminous shrub (Astragalus gummifer) of Western Asia. Use: Secret Artificial Water Mark.

GUM TRAGANTH: See gum tragacanth.

HIGGIN'S WATERPROOF INK: See waterproof ink.

HOUSEHOLD AMMONIA: See ammonium hydroxide.

HYDROCERUSSITE: See lead carbonate.

HYDROCHLORIC ACID: HCl; clear, colorless or slightly yellow, fuming liquid. Poisonous, irritating vapor; corrosive; miscible in all proportions with alcohol. The commercial variety is known as muriatic acid. Uses: Double Agent Red Secret Ink, Iodine Vapor Secret Ink Developer, Past Posting Secret Ink, Secret Buddha Ink, Secret Postal Card Ink, Soviet Method of Restoring Faded Writing.

HYDROCYANIC ACID (PRUSSIC ACID): HCN; a colorless, mobile, volatile liquid having a characteristic bitter almond odor. It is one of the deadly poisons. Source: formed with a solution of hydrogen cyanide in water. Use: Russian Instant Heart Attack Ink.

HYDROGEN SULFIDE: H_2S; a colorless gas having the extremely offensive odor of rotten eggs. It is heavier than air and slightly soluble in water. The gas is poisonous and when even a small quantity of it is inhaled, it produces headache and nausea. Uses: Australian Secret Vapor Ink, Reduction Developer, Secret Buddha Ink.

HYDROSULFIDE: See barium sulfhydrate.

HYDROXYBENZOIC ACID: See salicylic acid.

HYPO: See sodium thiosulfate.

INDIA (BLACK) INK: A nearly black pigment brought chiefly from China, used in water colors. It is in rolls or square cakes, and consists of lampblack or ivory black and animal glue. Called China ink. The true India ink is sepia. Source: Art stores. Use: Fireproof Ink.

INFUSION OF GALLS: See galls or gallnuts.

INDIA RUBBER: See caoutchouc.

INK: Writing ink is a solution mixture of ferrous sulfate and tannic acid with an appropriate dye or coloring agent for color. Uses: Vanishing Ink, Waterproof Ink.

IODIDE OF POTASH: See potassium iodide.

IODIDE OF POTASSIUM: See potassium iodide.

IODINE: I_2; pure iodine is a crystalline steel-gray solid; in air, however, this color quickly turns to purplish-black. Slightly soluble in water; more soluble in a water solution of potassium iodide; very soluble in alcohol. Uses: Glazed Paper Vanishing Ink, Iodine Vapor Secret Ink Developer, Mossad Secret Ink Developer, Vanishing Ink No. 10.

IPECAC SYRUP: Rhizome and Cephaelis roots. Use: Nausea Ink No.1.

IRIDIUM CHLORIDE: $IrCl_4$; dark red, deliquescent crystals; soluble in cold water. Uses: Bulgarian Poison Pen Ink, Secret Mercurial Ink.

IRON ALUM: See iron ammonium alum.

IRON AMMONIA SULFATE: See iron ammonium alum.

IRON AMMONIUM ALUM: $Fe_2(SO_4)_3.(NH_4)_2SO_4.24H_2O$; violet efflorescent crystals. Freely soluble in water; insoluble in alcohol. Uses: Appearing and Disappearing Traveling Ink, Blue Secret Code Ink, Blue Secret Reagent Ink, British Black and Blue Secret Ink, Brown Invisible Ink, Kitchen Black Secret Ink, Secret Water Ink for Bar Bets.

IRON CHLORIDE: See ferric chloride.

IRON SULFATE: See ferrous sulfate.

IRON SULFIDE: See ferrous sulfide.

LEAD ACETATE (SUGAR OF LEAD): $Pb(C_2H_3O_2)_2.3H_2O$; a white crystalline soluble salt of sweet taste; very poisonous. Commercial grades are frequently brown or gray lumps. Uses: Dark Brown Secret Vapor Ink, Dark Brown Vanishing Ink, PLO Secret Vapor Ink, Secret Buddha Ink.

LEAD CARBONATE, BASIC: $CbCO_3$; white hexagonal crystals or amorphous powder. Insoluble in hot and cold water; slightly soluble in aqueous carbon dioxide. Uses: Sealed Envelopes Secret Ink, Secret Fruit Ink Developer.

LEAD SALT: See lead acetate.

LEATHER POWDER: Use: Secret Furniture Ink.

LEEK JUICE: A lilaceous herb, allied to the onion, but with a cylindrical bulb (from which the juice is extracted) and flat leaves. Use: Brown Invisible Ink.

LEMON JUICE: The intensely acidic juice extracted from an oval or roundish fruit resembling the orange. Uses: Egg Ink, High Temperature Brown Invisible Ink, Temperature-Sensitive Invisible Ink.

LIME JUICE: A fruit allied to the lemon, but much smaller. Use: Brown Invisible Ink.

LINSEED OIL: Oil obtained by pressure from flax seed. Source: Hardware or paint store. Uses: Secret Water Ink, Secret Water Printing Ink, Syrian Permanent Invisible Ink.

LITHOGRAPHIC VARNISH AND TURPENTINE: See varnish.

LYCOPODIUM POWDER: A fine yellow powder consisting of the spores of the lycopodium plants. Use: Magic Secret Inkwell.

LYE: See sodium hydroxide.

MAGNESIA WHITE: See magnesium oxide or carbonate.

MAGNESITE: See magnesium carbonate.

MAGNESIUM CARBONATE: $MgCO_3$; white trigonal crystals. Soluble in acid, carbon dioxide water (soda water). Uses: British Black and Blue Secret Ink, Secret Water Printing Ink.

MERCURIC CHLORIDE: $HgCl_2$; white powder or heavy colorless crystals. Freely soluble in water, alcohol, ether. Extremely poisonous and dangerous to use. Unstable in solution when exposed to light. Solution: 68 grams per liter. Uses: Deep Red Secret Ink, Secret Ink for Temperature-Sensitive Paper, Yellow Secret Ink.

MERCURIC NITRATE: $Hg(NO_3)_2.2H_2O$; transparent crystals; decomposes when boiled. One part very soluble in 100 parts of cold water, decomposes in hot water; 1 part soluble in 100 parts of nitric acid, ammonia, acetone; insoluble in alcohol. Uses: Austrian Black Secret Ink, Black Invisible Ink.

MERCURY: Hg; mercury is the only metal that is liquid at ordinary temperatures; silvery white and heavier than lead. The soluble salts of mercury are poisonous. Uses: Secret Fire Ink, Secret Mercurial Inks.

METHYL ALCOHOL: CH_3OH; clear, colorless, mobile liquid. Has high solvent qualities: soluble (10 parts to 30 parts of solvent required to dissolve one part) in water, alcohol and ether. Uses: Secret Blue Blockout Ink, Secret Blockout Ink Blender, Secret Cutout Ink, Secret Luminous Ink, Secret Red Blockout Ink.

METHYL VIOLET 2 B BASE CONCENTRATED DYE: Use: Secret Blue Blockout Ink.

MILK: Use: Temperature-Sensitive Invisible Ink.

MINERAL OIL: A mixture of liquid hydrocarbon obtained from petroleum. Colorless, oily, nonflorescent, transparent liquid; becomes thicker with cold. Use: Perpetual Writing Pad.

MUCILAGE OF GUM ACACIA: See gum arabic.

MURIATIC ACID: See hydrochloric acid.

NAPHTHOL: $C_{10}H_7OH$; either of two isomers which are derivatives of naphthalene and have a white or yellow color. Use: Israeli Special Process Secret Ink.

NEMBUTAL ELIXIR (PENTOBARBITOL ELIXIR): Use: Mickey Finn Ink.

NICKEL CHLORIDE: $NiCl_2.6H_2O$; deliquescent monoclinic form and green color. Very soluble (1 part of solvent will dissolve 1 part of solid) in cold water; very soluble in hot water. Solution: 59 grams per liter. Use: Green Invisible Ink.

NICKEL NITRATE: $Ni(NO_3)_2.6H_2O$; green color; monoclinic crystalline form. Solution: 73 grams per liter. Use: Green Invisible Ink.

NITRATE OF BISMUTH: See bismuth nitrate.

NITRATE OF MERCURY: See mercuric nitrate.

NITRATE OF PROTOXIDE OF MERCURY: See mercuric nitrate.

NITRATE OF SILVER: See silver nitrate.

NITRIC ACID: HNO_3; a corrosive liquid with powerful oxidizing properties. Uses: Black Vanishing Ink, Dark Brown Secret Vapor Ink, Dark Brown Vanishing Ink, Empty Envelope Writing Developer, Israeli Special Process Secret Ink, PLO Secret Vapor Ink.

NON-ACID OIL: Use: Temperature-Sensitive Paper.

OCTOHYDRAL ALUM SALT: See potassium alum.

OIL OF CASSIA: a variety of cinnamon obtained from the bark (cassia bark) of a tree native to China. Use: Luminescent Secret Ink.

OIL OF CINNAMON: See cinnamic aldehyde.

OIL OF VITRIOL: See sulfuric acid.

OLEIC ACID: $CH_3(CH_2)_7CH{:}CH(CH_2)_7.COOH$; an unsaturated fatty acid found in natural fats and oils as a glyceride. Use: Secret Water Ink.

ONION: Cut across the grain, then scrape gently. The juice will start to flow almost immediately. Uses: Deep Reddish-Brown Invisible Ink, Iodine Vapor Secret Ink.

OPAQUE WHITE: An opaque pigment used to block out parts of photographic prints. Source: Photo supply store. Use: PLO Red Secret Printing Ink.

ORTHOACETOXYBENZOIC ACID: See aspirin.

OSMIUM TETRA OXIDE (OSMIC ACID): OsO_4; colorless monoclinic crystals. Soluble in cold water. Use: Reduction Developer.

OSMIUM TETROXIDE: See osmium tetra oxide.

OXALIC ACID: $C_2H_2O_4$; a strong poisonous white soluble crystalline organic acid. Uses: Invisible Process Ink, Secret Ink Magic.

OXIDE OF COBALT: See cobaltous oxide.

PALLADIUM CHLORIDE: $PdCl_2$; cubic needles, crystalline form, dark red color, deliquescent. Soluble in hot and cold water, hydrochloric acid and acetone. Source: Photography store. Uses: Iodine Vapor Secret Ink Developer, Secret Mercurial Ink.

PARAFFIN: A white, waxy substance resembling spermacetti; tasteless and odorless; obtained from coal tar, wood tar, petroleum, etc. by distillation. Source: Grocery store. Use: Secret Water Printing Ink No. 2.

PARATOLUIDINE: See toluidine.

PENTOBARBITAL ELIXIR: See nembutal elixir.

PEROSMIC OXIDE: See osmium tetroxide.

PETROL GASOLINE: See benzine.

PHENOL (CARBOLIC ACID, PHENIC ACID): C_6H_5OH; needles crystalline form, colorless. Soluble in water, ether

and alcohol. Solution: 20 grams in a liter of water. Uses: Fireproof Ink, Secret Blue Blockout Ink, Secret Cutout Ink, Secret Red Blockout Ink, Violet Secret Ink.

PHENOLPHTHALEIN: $C_{20}H_{14}O_4$; rhombic needles from dilute alcohol. Solution: 1 gram in 50 milliliters of alcohol and add 50 milliliters of water. Uses: Blowing the Color Out of Secret Red Ink, Chinese Red Secret Ink, Gestapo Blood-Red Secret Ink, Light Red Secret Ink, PLO Secret Red Printing Ink, Red Vanishing Ink.

PHOSPHORESCENT ZINC SULFIDE: A powder. Use: Invisible Typing Carbon Paper.

PHOSPHORUS: See yellow phosphorus.

PHOSPHORIC ACID (ORTHOPHOSPHORIC ACID): H_3PO_4; syrupy; soluble in hot or cold water. Solution: 16 grams per liter of water. Use: Invisible Ink Patent No. 1,423,246 (1922).

PLATINIC CHLORIDE: See platinum chloride.

PLATINUM CHLORIDE (PLATINOUS CHLORIDE): $PtCl_8H_2O$; red monoclinic crystals. Very soluble in hot or cold water: Uses: Bulgarian Poison Pen Ink, Fireproof Ink, Secret Mercurial Ink.

PLATINUMIC CHLORIDE: See platinum chloride.

PONTIANAK: See spirit varnish.

POTASH: See potassium carbonate.

POTASH ALUM: See potassium alum.

POTASSIUM ALUM: $K_2Al_2(SO_4)_4.24H_2O$; large, colorless, hard, transparent crystals or white crystalline powder. Freely soluble in water, glycerin; insoluble in alcohol. Use: Secret Egg Ink.

POTASSIUM BISULFATE ACID (POTASSIUM HYDROGEN SULFATE): $KHSO_4$; dissolves in water; decomposes in alcohol. Use: British Black and Blue Secret Ink.

POTASSIUM BROMIDE: KBr; white crystalline granules or powder. Uses: Brown Invisible Ink, Golden-Yellow Secret Ink.

POTASSIUM CARBONATE: K_2CO_3; deliquescent powder of white color. Soluble in hot and cold water. Solution: 207 grams per liter. Use: Black Appearing and Disappearing Ink.

POTASSIUM CHLORATE: $KClO_3$; transparent, colorless, crystals or white powder. Uses: Brown Invisible Ink, Detonator Pen, Secret Fiery Ink Pen, Secret Fiery Ink Bottle.

POTASSIUM CYANIDE: KCN; cubic colorless or white granular deliquescent crystals: extremely poisonous. Very soluble in hot and cold water; soluble in methyl alcohol. glycerin; slightly soluble in alcohol. Solution: 33 grams in 1 liter of water. Uses: Double Agent Red Secret Ink, Instant Killer Poison Ink, Soviet Method of Restoring Faded Writing, Soviet Method of Removing Wax Seals.

POTASSIUM DICHROMATE: $K_2Cr_2O_7$; red triclinic crystals. Soluble in water; insoluble in alcohol. Use: Waterproof Paper.

POTASSIUM FERRICYANIDE: $K_3Fe(CN)_6$; ruby-red lustrous crystals. Freely soluble in water; slightly soluble in alcohol. Unstable, deadly poisonous, dangerous to handle. Use: Chemiluminescence Ink. Note: potassium ferricyanide is most unsatisfactory for secret writing since it decomposes on the paper and becomes visible.

POTASSIUM FERROCYANIDE: $K_4Fe(CN)_6.3H_2O$; yellow monoclinic crystalline form. Soluble in water. Solution: 53 grams per liter of water. Uses: Blue Secret Reagent Ink, British Black and Blue Secret Ink, Brown Secret Ink, Dark Green Secret Ink, Reddish-Brown Secret Ink, Sealed Envelopes Secret Ink.

POTASSIUM HYDROXIDE: KOH; deliquescent lumps or sticks. Poisonous; attacks the skin, inflicting severe burns. Soluble in hot and cold water; very soluble in alcohol; slightly soluble in ether. Alkali solutions must be protected from air

by having the bottle stoppers coated with vaseline. Use: Gestapo Blood-Red Secret Ink.

POTASSIUM IODIDE: KI; cubic colorless or white crystals, granules or powder. Soluble in cold and hot water, alcohol, ammonia; slightly soluble in ether. Uses: Deep Red Secret Ink, Glazed Paper Vanishing Ink, Kitchen Secret Purple Ink, Mossad Secret Ink Developer.

POTASSIUM NITRATE: KNO_3; known as saltpeter. Colorless; rhombic, trigonal crystalline form. Insoluble in alcohol and ether. Solution: 50 grams per liter of water. Uses: Secret Pyrotechnic Commercial Printing Ink, Secret Pyrotechnic Stage Ink.

POTASSIUM SULFATE: See potassium alum.

POWDERED ACACIA: See gum arabic.

PRUSSIDE OF POTASH: See potassium cyanide.

PYRAMIDON (AMIDO PYRINE): $C_{13}H_{17}N_3O$; a water soluble crystalline solid, used chiefly to reduce or prevent fever and to relieve pain. Pyramidon is the pharmaceutical name for amido pyrine, which is also known as dimethylamino antipyrine, amino pyrine, dimethyl-amino-phenyl-pyrazolone. Use: Norwegian Soft Blue Secret Ink.

PYROXLYIN: A substance resembling gun cotton in composition and properties, but distinct in that it is more nitrified and is soluble in alcohol, ether, etc. Use: Secret Water Ink.

QUININE SULFATE: $(C_{20}H_{24}N_2O_2)_2.H_2SO_4$; silky effloresent needles. Use: Big Brother Blue Secret Ink.

QUININE SULPHATE: See quinine sulfate.

REDUCING AGENT: Reduction is the process of removing oxygen from a compound. A substance which can effect such a removal of oxygen is called a reducing agent. Use: Electrochemical Developer.

RESORCINOL: $C_6H_4(OH)_2$; a colorless crystalline benzene derivative obtained from certain resins. Use: Tamper Information Invisible Ink.

RHODAMINE BASE DYE: A red dye obtained by heating an amino derivative of phenol with phthalic anhydride. Use: Secret Red Blockout Ink.

RICE: A well-known cereal grass (Oryza sativa) and its seed. Use: Kitchen Secret Purple Ink.

ROMAN ALUM: See potassium alum.

ROSE WATER: A fragrant solution created by distilling the oil from roses and combining it with water. Used as a fragrance or in cooking. Use: Invisible Process Ink.

ROSIN (COLOPHONY): $C_{20}H_{30}O_2$; largely abietic acid. Commonest and cheapest resin. Graded according to color. Source: Music stores (used on bows of stringed instruments). Use: Secret Pyrotechnic Printing Ink.

SAL AMMONIAC: See ammonium chloride.

SALICYLIC ACID: $C_6H_4(OH)(l)(COOH)(_2)$; monoclinic colorless needles. Use: Secret Cutout Ink.

SALIVA: The watery, viscid, slightly acid fluid which is secreted by the glands of the mouth, containing enzyme and ptyalin. Use: Iodine Vapor Secret Ink Developer.

SALT: See sodium chloride.

SALT OF SATURN: See lead acetate.

SALTPETER: See potassium nitrate.

SILVER CHLORIDE: AgCl; white cubic crystalline form. Use: Black Invisible Ink.

SILVER NITRATE: $AgNO_3$; a white crystalline salt of silver, obtained from the dissolution of silver in dilute nitric acid. Blue Secret Laundry Marking Ink, Electrochemical Developer, Empty Envelope Writing Developer, Iodine Vapor Secret Ink Developer, Reduction Developer, Secret Fiery Ink Bottle, Secret Ink to Cheat Bookmakers, Silver Nitrate Developer.

SOAPSTONE: A massive variety of talc in soft stone form with a soapy or greasy feel. Source: Art supply stores. Use: Blue and Red Blockout Inks.

SODA: See sodium carbonate.

SODA ASH: See sodium carbonate.

SODIUM ACETATE: $NaC_2H_3O_2.3H_2O$; colorless, transparent, efflorescent crystals. Very soluble in water; soluble in alcohol. Solution: 1 part of the salt in 10 parts of water. Use: Israeli Special Process Secret Ink.

SODIUM BICHROMATE: See sodium dichromate.

SODIUM BORATE: See sodium tetraborate.

SODIUM CARBONATE: $Na_2CO_3.10H_2O$; colorless crystals, white crystalline granules or white powder. Crystals effloresce in air. Freely soluble in water; soluble in glycerin; insoluble in alcohol. Uses: Appearing and Disappearing Traveling Ink Trick, Blue Secret Code Ink, Light Red Secret Ink, PLO Red Secret Printing Ink.

SODIUM CHLORATE (CHLORATE OF SODA): $NaClO_3$; cubic or trigonal crystalline form. Dissolves when heated; soluble in water. Use: Green Secret Ink.

SODIUM CHLORIDE: NaCl; cubic colorless crystals. Soluble in cold and hot water, glycerin; slightly soluble in alcohol, liquid ammonia, hydrochloric acid. Uses: Brown Invisible Ink, Children's Green Non-poisonous Commercial Invisible Ink, Mossad Secret Ink Developer.

SODIUM DICHROMATE: $Na_2Cr_2O_7.2H_2O$: red monoclinic crystals. Soluble in water. Use: Waterproof Paper.

SODIUM FERROCYANIDE: $Na_4Fe(CN)_6.10H_2O$; monoclinic crystalline form and yellow color. Soluble in water; insoluble in alcohol. Uses: Appearing and Disappearing Traveling Ink, Blue Secret Code Ink, Secret Water Ink for Bar Bets.

SODIUM HYDROXIDE: NaOH; white deliquescent lumps or sticks. Soluble in cold or hot water; very soluble in alcohol,

ether, glycerin; insoluble in acetone. Uses: Blowing the Color Out of Secret Red Ink, Blue Secret Laundry Marking Ink, PLO Red Secret Printing Ink, Yellow Secret Ink.

SODIUM HYPOSULFITE: See sodium thiosulfate.

SODIUM PERBORATE: $NaBO_3.4H_2O$; a salt formed by the reaction between a borate and hydrogen peroxide. Use: Chemiluminescence Ink.

SODIUM SALICYLATE: $NaC_7H_5O_3$; white crystals. Soluble in water, alcohol. Use: Secret Water Ink for Bar Bets.

SODIUM SILICATE: Na_2SiO_3; amorphous. Soluble in cold and hot water; insoluble in sodium or potassium salts, alcohol. Use: Secret Pyrotechnic Printing Ink.

SODIUM SULPHOCYANATE: See sodium thiosulfate.

SODIUM TETRABORATE: $Na_2B_4O_7.10H_2O$; a white crystalline salt. Soluble in water, glycerol; insoluble in absolute alcohol. Source: Available in grocery stores (laundry section) as borax. Use: Fireproof Paper.

SODIUM THIOSULFATE: $Na_2S_2O_3.5H_2O$; monoclinic colorless efflorescent crystals. Soluble in water, ammonia; insoluble in alcohol. Solution: 1 part in 40 parts of water. Source: Photography store. Uses: Hitler's Secret Crimson Anatomy Ink, Red Secret Ink, Sucker Bet Secret Ink No. 2.

SOLUBLE STARCH: See starch.

SPIRIT NIGROSINE SS B DYE: One of the blue-black dyes which are derivatives of aniline. Use: Secret Blue Blockout Ink.

SPIRIT VARNISH: A special type of paint. A solution of gum or resin in alcohol that dries quite rapidly. Use: Temperature-Sensitive paper.

SPIRITS OF NITRE: See nitric acid.

STARCH: $(C_6H_{10}O_5)x$; a white amorphous hygroscopic powder that yields dextrin by hydrolysis. Use: Blue Vanishing Ink for Love Letters.

STARCH GUM: See dextrin.

SUB-CARBONATE OF POTASS: See potassium carbonate.

SUGAR (SUCROSE): $C_{12}H_{22}O_{11}$; ordinary cane sugar or beet sugar. Uses: Detonator Pen, Israeli Pale Blue Secret Ink, Permanent Invisible Ink, Secret Fiery Ink Pen, Secret Fiery Ink Bottle, Temperature-Sensitive Invisible Ink, Violet Secret Ink.

SUGAR OF LEAD: See lead acetate.

SUGAR SOLUTION: Use: Temperature-Sensitive Ink.

SULFATE OF IRON: See ferrous sulfate.

SULFUR: S; pale yellow, brittle, crystalline solid. Insoluble in water and most acids; dissolves readily in carbon disulfide. Use: Secret Pyrotechnic Printing Ink.

SULFURIC ACID: H_2SO_4; colorless oily liquid or hexagonal crystals. Miscible with cold water (evolves heat); miscible with hot water; dissolves in alcohol; miscible with organic solvents. In making a dilute solution of the acid, care must be taken to avoid dangerous spattering that would result if steam were produced. This is done by pouring the acid slowly into the water (never the reverse), accompanied by constant stirring. Uses: Big Brother Blue Secret Ink, Black Vanishing Ink, Cigarette Moocher Secret Ink, Dark Brown Secret Vapor Ink, Dark Brown Vanishing Ink, Detonator Pen, Israeli Pale Blue Secret Ink No. 2, Israeli Special Process Secret Ink, Past Posting Secret Ink, Permanent Black Invisible Ink, PLO Secret Vapor Ink, Secret Fiery Ink Pen, Secret Furniture Ink, Secret Ink Magic, Secret Violent Fiery Ink Bottle, Sucker Bet Secret Ink, Tamper Information Invisible Ink, Temperature-Sensitive Invisible Ink, Turkish (MIT) Black Secret Ink, White Secret Ink.

SULFURIC ETHER: See diethyl ether.

SULPHATE OF COPPER: See copper sulfate.

SULPHURIC ACID: See sulfuric acid.

SULPHURIC ETHER: See diethyl ether.

SYRUPY PHOSPHORIC ACID: See phosphoric acid.

TANNIC ACID (TANNIN): $C_{14}H_{10}O_9$; lustrous, yellow amorphous powder. Very soluble in water, alcohol. Uses: Black Vanishing Ink, Iodine Vapor Secret Ink Developer, Past Posting Secret Ink, Secret Black Anatomy Ink, Secret Ink Magic, Secret Water Ink for Bar Bets, Soviet Method of Restoring Faded Writing.

TARTARIC ACID: $(CHOHCO_2H)_2$; colorless monoclinic crystals. Solution: 1 part of acid in 3 parts of water. For a saturated solution, dissolve 750 grams of tartaric acid and dilute to one liter. Source: "Cream of Tartar" in grocery stores. Uses: Blue Secret Reagent Ink, Empty Envelope Writing Developer.

TEA: An evergreen plant, Camellia sinensis, whose leaves are used to make beverages. Source: Grocery store. Use: Kitchen Secret Black Ink.

TETRACHLOROETHANE: $Cl_3C.CH_2Cl$; colorless liquid. Insoluble in water, miscible in alcohol and ether. Use: Secret Water Printing Ink No. 2.

TETRACHLORO-METHANE: See carbon tetrachloride.

3-AMINO-PHTHALHYDRA-
ZIDE (LUMINOL): $NH_2C_6H_3$; almost white to yellow crystalline compound. It gives off a brilliant luminescence when it is treated in an alkaline solution with an oxidizing agent, such as hydrogen pyroxide. Used by police department homocide squads to bring out bloodstains on floors, carpets, etc. Also known as 5-amino-2, 3-dihydro and 4-phthalazinedione. Use Chemiluminescence Ink.

TINCTURE OF IODINE: Solution: add 70 grams of iodine and 50 grams of potassium iodide to 50 milliliters of water. Dilute to 1 liter with alcohol. Uses: Blue Vanishing Ink for Love Letters, Vanishing Ink No. 9.

TOLUIDINE: $CH_3C_6H_4NH_2$; any one of three isomeric amino derivatives of toluene analogous to aniline and paratoluidine, especially the commonest one, or

paratoluidine, which is obtained as a white crystalline substance. Use Tamper Information Invisible Ink.

TRIBASIC SODIUM PHOSPHATE: $Na_3PO_4.12H_2O$; white trigonal crystalline form. Soluble in cold water, dissolves in hot water; insoluble in carbon disulfide. Use: Chemiluminescence Ink.

TRISODIUM PHOSPHATE: See tribasic sodium phosphate.

TUNG OIL: A yellow to brown oil extracted from the seed of a Chinese tree. Use: Secret Water Printing Ink.

TURMERIC: The powder made from the root of an East Indian plant of the ginger family. Uses: Sealed Envelope Secret Ink, Secret Pass-Out Ink.

TURPENTINE: A resinous compound obtained from pine trees. Also known as spirits of turpentine or oil of turpentine. Source: Available in most paint stores. Use: Sealed Envelope Secret Ink.

URANIUM ACETATE: See uranyl acetate.

URANYL ACETATE: $UO_2(C_2H_3O_2)_2.2H_2O$; rhombic yellow crystals. Uses: Dark Brown Secret Vapor Ink, Dark Brown Vanishing Ink, PLO Secret Vapor Ink, Sealed Envelopes Secret Ink.

URANYL NITRATE: UN_2; slightly radioactive uranium compound; yellow-green in color. Use: Bright Yellowish-Green Secret Ink.

VARNISH: A viscid liquid, consisting of a solution of resinous matter in an oil or a volatile liquid. Source: Paint store. Uses: Blue Printing Press Invisible Ink, Sealed Envelopes Secret Ink, Temperature-Sensitive Paper.

VEGETABLE JUICE: Use: Temperature-Sensitive Invisible Ink.

VENICE TURPENTINE (VENICIAN TURPENTINE): Turpentine from the common larch, pinus larix. Use: Perpetual Writing Pad.

VICTORIA BLUE B BASE DYE: Use: Secret Blue Blockout Ink.

VICTORIA GREEN W B CRYSTALS DYE: Use: Secret Luminous Ink.

VINEGAR: A mixture of water and acetic acid (q.v.); clear with little color and a sharp odor. Source: Grocery Store. Use: Brown Invisible Ink, Children's Green Non-poisonous Commercial Invisible Ink, Secret Egg Ink.

VITRIOLIC ACID: See sulfuric acid.

WASHING SODA: See sodium carbonate.

WATER GLASS: See sodium silicate.

WATERPROOF INK: Use: Soviet Method Of Removing Wax Seals.

WAX: A white or colorless waxy mixture of hydrocarbons not easily acted upon by reagents, obtained chiefly from petroleum. Use: Secret Egg Ink.

WHISKEY: An intoxicating liquor distilled from grain, potatoes, etc. Use: Secret Water Ink.

WHITE GARLIC JUICE: See garlic juice.

WHITE LEAD: See lead carbonate.

WHITE LINSEED OIL LITHOGRAPHIC VARNISH: Use: Secret Water Printing Ink.

WHITE PHOSPHORUS: See yellow phosphorus.

WHITE ZINC: See zinc oxide.

WOOD NAPTHA: See methyl alcohol.

WOOD SPIRIT: See methyl alcohol.

X-PREP LIQUID: A standard extract of senna fruit. Used as a laxative. Source: Gray Pharmaceutical Co., 50 Washington St., Norwalk, CT 06856. Use: Nausea Ink No. 2.

XYLENE (XYLOL): $C_6H_4(CH_3)_2$; colorless liquid. Insoluble in water, soluble in alcohol; very soluble in ether. Use: Secret Water Printing Ink No. 2.

YELLOW PHOSPHORUS: P_4; cubic colorless to yellowish waxlike solid. Slightly soluble in hot water. Uses: Hustler's Luminous Secret Ink, Luminescent Secret Ink, Secret Luminous Lover's Ink.

YELLOW PRUSSIATE OF POTASH: See potassium ferrocyanide.

ZINC OXIDE: ZnO; white or yellowish amorphous powder. Soluble in mineral acid, dilute acetic acid, ammonium hydroxide. Use: Sealed Envelopes Secret Ink.